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A COMPARISON OF PARTICIPATION IN MATHEMATICS OF MALE AND FEMALE STUDENTS IN THE TRANSITION FROM JUNIOR TO SENIOR HIGH SCHOOL IN WEST JAVA - INDONESIA

The Ohio State University

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A COMPARISON OF PARTICIPATION IN MATHEMATICS OF MALE AND FEMALE STUDENTS IN THE TRANSITION FROM JUNIOR TO SENIOR HIGH SCHOOL IN WEST JAVA - INDONESIA

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

BY
Endang T. Ruseffendi, S.M.Pd., S.Pd., M.S.

The Ohio State University
1986

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Dr. Lorren L. Stull

Approved by

Faculty of Science and Mathematics Education
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Acknowledgments</th>
<th>ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vita</td>
<td>iv</td>
</tr>
<tr>
<td>List of Tables</td>
<td>x</td>
</tr>
<tr>
<td>List of Figures</td>
<td>xii</td>
</tr>
</tbody>
</table>

## I. INTRODUCTION

<table>
<thead>
<tr>
<th>Indonesia and Education</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geography and Population</td>
<td>2</td>
</tr>
<tr>
<td>Education</td>
<td>7</td>
</tr>
<tr>
<td>Problems in Education</td>
<td>13</td>
</tr>
<tr>
<td>The Role of Women in Indonesia</td>
<td>18</td>
</tr>
<tr>
<td>Political Status of Women and Government Involvement</td>
<td>18</td>
</tr>
<tr>
<td>Women's Organizations in Indonesia</td>
<td>19</td>
</tr>
<tr>
<td>The Status and Roles of Indonesian Women in Society</td>
<td>22</td>
</tr>
<tr>
<td>Background for the Study</td>
<td>27</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>35</td>
</tr>
<tr>
<td>Assumptions and Limitations</td>
<td>36</td>
</tr>
<tr>
<td>Assumptions</td>
<td>36</td>
</tr>
<tr>
<td>Limitations</td>
<td>37</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>40</td>
</tr>
<tr>
<td>Hypotheses</td>
<td>43</td>
</tr>
<tr>
<td>Overview of the Following Chapters</td>
<td>43</td>
</tr>
</tbody>
</table>

## II. REVIEW OF LITERATURE

<table>
<thead>
<tr>
<th>Women's Participation in Mathematical Activities</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women's Performance in Mathematics</td>
<td>48</td>
</tr>
<tr>
<td>Attitudes Toward Mathematics</td>
<td>50</td>
</tr>
<tr>
<td>Cognitive Variables</td>
<td>51</td>
</tr>
<tr>
<td>Affective Variables</td>
<td>53</td>
</tr>
<tr>
<td>Social Environment Variables</td>
<td>61</td>
</tr>
<tr>
<td>Causal Attribution in Learning Mathematics</td>
<td>64</td>
</tr>
</tbody>
</table>

## III. METHODS AND PROCEDURES

<table>
<thead>
<tr>
<th>Place of Study</th>
<th>68</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the Subjects</td>
<td>74</td>
</tr>
</tbody>
</table>
APPENDIX F. Mathematics Content in the Secondary School Curriculum in Indonesia (1975 Curriculum) ... 194

APPENDIX G. Mathematics Scores of Ninth Graders in MAT 1984/1985 .............................................................. 200

APPENDIX H. Mathematics Scores of Senior High School Graduates in CEEM 1983 ................................. 202
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>Student Population in 1981/1982</td>
<td>12</td>
</tr>
<tr>
<td>Table 2</td>
<td>Numbers of University Students Majoring in Mathematics and Female Faculty members in Bandung, 1984 and 1985</td>
<td>29</td>
</tr>
<tr>
<td>Table 3</td>
<td>Public Junior and Senior High Schools in Bandung (1985) and West Java (1981/1982)</td>
<td>73</td>
</tr>
<tr>
<td>Table 4</td>
<td>The Sample for Measuring Students' Performance</td>
<td>77</td>
</tr>
<tr>
<td>Table 5</td>
<td>The Sample for Measuring Students' Attitudes Toward Mathematics and Life Expectation</td>
<td>78</td>
</tr>
<tr>
<td>Table 6</td>
<td>Instruments Related to the Subjects and Purposes</td>
<td>81</td>
</tr>
<tr>
<td>Table 7</td>
<td>The Reliability Coefficients of the Instruments</td>
<td>84</td>
</tr>
<tr>
<td>Table 8</td>
<td>Statistical Methods/Tests, Related Subjects and Purposes</td>
<td>88</td>
</tr>
<tr>
<td>Table 9</td>
<td>JHS3B Students' Performance in Mathematics</td>
<td>90</td>
</tr>
<tr>
<td>Table 10</td>
<td>ANOVA for JHS3B Students' performance in Mathematics</td>
<td>91</td>
</tr>
<tr>
<td>Table 11</td>
<td>SHS3 Students' Performance in Mathematics</td>
<td>91</td>
</tr>
<tr>
<td>Table 12</td>
<td>The Normality Test for Data in Table 11</td>
<td>92</td>
</tr>
<tr>
<td>Table 13</td>
<td>JHS3A and SHS1 Students' Responses in Attitude and Life Expectation</td>
<td>94</td>
</tr>
<tr>
<td>Table 14</td>
<td>JHS3A and SHS1 Students' Responses in Attitudes and Life Expectation by Sex, by Grade, and by Sex and Grade</td>
<td>95</td>
</tr>
<tr>
<td>Table 15</td>
<td>ANOVA for Confidence in Learning Mathematics Scale</td>
<td>99</td>
</tr>
<tr>
<td>Table 16</td>
<td>ANOVA for Mathematics Anxiety Scale</td>
<td>100</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

Figure 1. Indonesia on the Map of the World ......................... 3
Figure 2. The Islands and some of the Islets of Indonesia ........ 4
Figure 3. The Territory of Indonesia Compared with that of the U. S. Mainland ........................................... 5
Figure 4. The Territory of Indonesia Compared with that of Europe ................................................................ 6
Figure 5. The Schooling System of Indonesia ......................... 10
Figure 6. Female Students' Participation in Exact Sciences Compared to Male Students in Elementary School, Junior High School, Senior High School, and Universities and Institutes in Indonesia .............. 17
Figure 7. Weiner's Model on Causal Attributions ..................... 65
Figure 8. West Java Province with the Capital City of Bandung ................................................................. 69
Figure 9. Java with the Three Provinces and Two Special Regions ............................................................... 71
Figure 10. JHS3A and SHS1 Students' Responses in Attitudes and Life Expectation .............................................. 94
Figure 11. JHS3A and SHS1 Students' Responses in Attitudes and Life Expectation by Sex ................................. 96
Figure 12. JHS3A and SHS1 Students' Responses in Attitudes and Life Expectation by Grade .............................. 96
Figure 13. JHS3A and SHS1 Students' Responses in Attitudes and Life Expectation by Sex and Grade ................... 97
Figure 14. Illustration of Interaction between Sex and Grade on the Confidence in Learning Mathematics Scale ................................................................. 99
Figure 15. Illustration of Interaction between Sex and Grade on the Mathematics Anxiety Scale ...................... 100
Figure 16. Illustration of Interaction between Sex and Grade on the Mathematics Usefulness Scale .......... 102

Figure 17. Illustration of Interaction between Sex and Grade on the Mathematics as a Male Domain Scale ... 103

Figure 18. Illustration of Interaction between Sex and Grade on the Attitude toward Success in Mathematics Scale .......................................................... 104

Figure 19. Illustration of Interaction between Sex and Grade on the Effectance Motivation in Mathematics Scale .............................................................. 106

Figure 20. Illustration of Interaction between Sex and Grade on the Students' Perceptions of Mathematics Teachers' Attitudes Scale ..................... 107

Figure 21. Illustration of Interaction between Sex and Grade on the Students' Perceptions of their Father's Attitudes Scale ......................... 108

Figure 22. Illustration of Interaction between Sex and Grade on the Students' Perceptions of their Mothers' Attitudes Scale ...................... 110

Figure 23. Illustration of Interaction Between Sex and Grade on Life Expectation Scale ......................... 111

Figure 24. Means of Students' Attitudes toward Mathematics and Life Expectation by School .................. 114
In the world today, modern technology has an important role. Whereas modern technology could not have been developed with such fields of study as mathematics and science, mathematics is increasingly in demand. To be a technological modern country, the people in the country, men and women, should participate fully in mathematical activities. In the modern world there are many jobs that seem to be well suited to women, such as medical doctor, dentist, pharmacist, scientist, teacher, and teacher educator.

Unfortunately, the participation of Indonesian women in mathematical activities, especially at higher levels, is very small. This situation should be changed. Reasons must be found to convince women to participate more fully in mathematical activities. Could it be that there are fewer women, that their mathematical performance is lower, that their attitudes toward mathematics are less positive, their life expectations are different, their social status is inferior?

In order to place the problem in an Indonesian context, the geography, population, education, and the roles of women in Indonesia will be described first.
Indonesia and Education

Geography and Population

Indonesia is an island country. It consists of more than 13,677 islands and islets spreading between 10° to the north and 10° to the south of the equator and between 90° and 145° to the east of the Prime Meridian. The five main islands are Kalimantan, Irian Jaya, Sumatra, Sulawesi, and Java. To the north are Malaysia and the Philippines; to the east, Papua New Guinea. Australia lies to the south, and the Indian Ocean on the west. (Figures 1 and 2). Its land area is about 2,027,087 square kilometers (about 781,728 square miles) and its sea area is about 3,166,163 square kilometers (about 1,221,002 square miles) (Country Report, 1985, p. 1). In total surface area, Indonesia is about 386,000 square miles larger than the total land area of the United States (GIA, 1982). The length of the territory from west to east is as long as the distance between California and New York (Figure 3) or, from a European perspective, the distance between the west coast of Great Britain to the Caspian Sea (Embree, 1934) (Figure 4).

Indonesia is a highly populated country. The 1980 population census recorded a total population of 146,776,473 (Statistical Yearbook of Indonesia 1983, 1984, p. 47). Based on the Population Projection of Indonesia by Province 1980-1990, the population of Indonesia in 1985 was 165,153,600. Sixty-one percent of this population lives on the fifth largest island, Java, which has a land area about four-fifths the size of the State of Illinois (ibid.).
Figure 1. Indonesia on the Map of the World
Figure 2. The Islands and some of the Islets of Indonesia
Figure 3. The Territory of Indonesia Compared with that of the U. S. Mainland

Source: Garuda Indonesian Airways, 1979
Figure 4. The Territory of Indonesia Compared with that of Europe

Source: Statistical Yearbook of Indonesia 1983, 1984
According to the 1980 figures, 94% of the population of Java were Moslems. In terms of population, Indonesia is the fifth largest country in the world. Only the Peoples Republic of China, India, the USSR, and the United States of America are larger. In 1980, more than 87% of the population of Indonesia were Moslems.

Based on the number of people, the area of the territory, and natural resources, such as oil, Indonesia is a major nation. Educational changes could make a significant contribution to many people.

Education

The educational system of Indonesia is centralized. The office of the Department of Education and Culture is located in the capital city, Jakarta. In each of the 27 provinces, there are regional departments of education and culture, called Regional Offices, that represent the central office. Formal education is comprised of elementary education, secondary education, and tertiary education.

Elementary education is compulsory for children ages 7 to 12. Almost all of the elementary schools are public institutions (USAID, 1982, p.1; Country Report, 1985, p. 36; BP3K, 1982).

There are two levels of secondary schools. The first is Junior High School for children aged 13 to 15. The second level of secondary school provides the following options for children aged 16 to 18: Senior High School (college-bound students), Vocational School (technical, commerce, home economics, etc.), and Teacher Training School (for prospective elementary school teachers).
Generally, each program is three years in length. Most students are enrolled by the state (USAID, 1982, p. 17; BP3K, 1981).

Tertiary education mainly consists of two types of schooling: university or institute, and academy. University or institute matriculation requires at least a four year program. Some of the university or institute programs are degree or diploma granting. The academy program is two years long.

University programs in Indonesia are similar to university programs in other countries. In large Indonesian cities, schools of education are separate from the universities. They are called Institutes of Teacher Training and Educational Sciences (IKIPs). It is reasonable in large cities for schools of education to be separated from the universities, because the number of prospective teachers is large. For example, in a 1985 survey in Bandung, Ruseffendi found that the student population of the Institute of Teacher Training and Educational Sciences Bandung was in excess of 13,000 while in the same year the student population of the Institute of Technology Bandung and the University of Padjadjaran Bandung were less than 9,000 and less than 14,000 respectively. If all the state tertiary institutions in Bandung were to join together to make a new university, the number of students enrolled in the school of education would be more than 36.1% of the total enrollment. On the other hand, the largest number of students in one of the other schools is 2178, or 6.1% of the hypothetical student body of 36,000. The school of education (students, faculty
members, and administrators) would be a dominant force in such a university. If the government were to ask the Institute of Teacher Training and Educational Sciences Bandung to admit more students to counter teacher shortages, particularly in science and mathematics, the school of education in the university would be even more dominant.

The schooling system of Indonesia can be diagrammed as shown in Figure 5. To finish study at the highest levels, generally one needs far more time than indicated in the boxes.

IKIP=Institute of Teacher Training and Educational Sciences.
Sarjana's study is the first degree academic program carried out by university or institute (and Institute of Teacher Training and Educational Sciences as well). It is equivalent to the Bachelors level (USAID, 1982, p. 51; Sukra, 1982, p. 10).

Magister's study is an inter-study between sarjana's study and doctoral study. It is equivalent to a master's program (ibid, 1982, p. 64; ibid, 1982, p. 10).

During and prior to the 1970s, bachelor's (or three-year programs) were the first academic degrees awarded by a university or institute, and master's degrees (or two-year programs beyond the bachelor's program) were the second degrees offered by many tertiary institutions.
Figure 5. The Schooling System of Indonesia
The difference between universities and institutes is that in Indonesia, universities offer academic degrees for several different academic and professional areas, such as sociology, mathematics, and medicine, while institutes offer academic degrees for one profession only, such as in teaching or engineering.

In 1982 there were 110,050 public and private schools with a combined enrollment of 23,862,488 students; 11,640 public and private junior high schools with a combined enrollment of 3,736,020 students; 3,378 public and private senior high schools with a total of 1,286,464 college-bound students, and 368 public and private universities and institutes with a combined enrollment of 504,000 students (BP3K, 1981, 1982; USAID, 1982, pp. 46, 48). The student population in 1982 is displayed greater detail in Table 1.

Based on USAID figures (1982, p. 18), in 1980, 2.9% of junior secondary school students came from Junior Vocational Schools and 46.4% of senior secondary school students came from Senior Vocational schools, and Teacher Training Schools (Sports Teacher Training School, inclusive). These data are not included in the table because almost all of the students were in terminal degree programs. The Junior Vocational School had been abolished.

Some other programs, for example, those operated by the Departments of Religion and Agriculture, are outside the primary and secondary school programs operated by the Department of Education and Culture. There were 15,000 primary schools, 182 public junior secondary schools (with 23,000 students), 1,512 private junior
Table 1

Student Population in 1981/1982

<table>
<thead>
<tr>
<th>Institution</th>
<th>Public Schools</th>
<th>Public Students</th>
<th>Private Schools</th>
<th>Private Students</th>
<th>Total Schools</th>
<th>Total Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary Schools</td>
<td>99,359</td>
<td>21,648,867</td>
<td>10,691</td>
<td>2,213,621</td>
<td>110,050</td>
<td>23,862,488</td>
</tr>
<tr>
<td>Junior High Schools</td>
<td>4,783</td>
<td>2,409,906</td>
<td>6,857</td>
<td>1,326,114</td>
<td>11,460</td>
<td>3,736,020</td>
</tr>
<tr>
<td>Senior High Schools</td>
<td>1,029</td>
<td>744,036</td>
<td>2,349</td>
<td>542,428</td>
<td>3,378</td>
<td>1,286,464</td>
</tr>
<tr>
<td>University/Institute</td>
<td>43</td>
<td>321,000</td>
<td>325</td>
<td>183,000</td>
<td>368</td>
<td>504,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>105,214</td>
<td>25,123,809</td>
<td>20,222</td>
<td>4,265,163</td>
<td>125,436</td>
<td>29,388,972</td>
</tr>
</tbody>
</table>

Note: 1. In the table, the annex, subsized, and aided schools are included with the public schools.
2. Senior high school students are college-bound students; teacher training and vocational schools are excluded.
3. Schools controlled by other than the Ministry of Education and Culture are excluded.

Sources: BP3K, 1981, 1982; USAID, 1982
secondary schools (with 132,000 students), 42 public senior secondary schools (with 4,700 students), and 312 private senior secondary schools (with 29,000 students) operated directly or control of the Department of Religion (1976 figures). The Department of Agriculture has 99 schools (grades 10-12 with an enrollment of 15,000 (ibid, pp. 2, 17). These numbers are relatively small compared to the related numbers in Table 1.

The medium of instruction is Bahasa Indonesia (Indonesian language), except in grades I and II of elementary schools outside the cities, where the local language is usually used. Except in foreign language instruction for certain levels, all levels of education, elementary, secondary, and tertiary, (including kindergarten in the cities) use Bahasa Indonesia as the medium of instruction; no local languages--no foreign languages.

Problems in Education

Today there are several problems in Indonesian education. Three which are particularly relevant to this dissertation are:

1. Teacher shortages, especially in mathematics and science;
2. Limited capacity of tertiary institutions;
3. The under-representation of female students at tertiary institutions in the exact sciences.

Regarding the first problem, teacher shortages, in almost all of the Institutes of Teacher Training and Educational Sciences (IKIPs) operate crash programs: three-year, two-year, and one-year programs for prospective secondary school teachers. They are called diploma
programs. Unfortunately, the output has never been great enough to meet the demand. As a result, the government has recently asked nine institutes and universities that do not have schools of education to institute temporary teacher training programs. Now they have three-year crash programs for prospective secondary school teachers in mathematics and science. Hopefully, the output of all these programs, combined with the regular teacher training programs, will overcome the increase of secondary school age population which is due to elementary education becoming compulsory.

Pramoetadi, the Director of Academic Affairs, Directorate-General of Higher Education, Indonesia, said, "Over the next five years we need 143,000 more school teachers. That means 28,000 graduates a year. So each IKIP and faculty of Education should be graduating 500 teachers every year." (DGHR, 1982, p. 7) Another resource said, "For the country as a whole, it is estimated that by 1995, almost 34,000 more secondary teachers will be needed than will be produced." (USAID, 1982, p. 25) Therefore, motivating females and males to choose teaching as a profession is necessary.

The second problem is concerned with the limited capacity of tertiary institutions. That is, the capacity of universities and institutes is small, while the secondary school output is overwhelming. USAID said, "With a total school population in excess of that for all of North America, ... the educational leadership has a prodigious task." ... "The rapidly growing numbers of graduates from the secondary schools are... clamouring for further education
and training, yet at present, the higher education system can accommodate only about two percent of the 19-25 year age group." (ibid, pp. 20, 49).

In 1980, all the state universities and institutes had admitted 17.6% of the applicants; IKIPs' had admitted 21.7% (ibid, p. 50). A survey of almost all the state Institutes of Teacher Training and Educational Sciences in 1981 showed that only 22% of the applicants were admitted. In the academic years 1981/1982 and 1982/1983 all the state universities and institutes admitted 13.0% and 13.7% of the applicants respectively (Ruseffendi, 1983a). In 1984, 15.3% of the applicants to all state universities and institutes were admitted (13.7% entering mathematics and science) (Direktorat Jenderal Pendidikan Tinggi, 1984). Another survey in 1985 recorded that only 3.1% (120 of 3862) of the applicants to a three-year crash program in the Faculty of Mathematics and Science Education, Institute of Teacher Training and Educational Sciences Bandung, were admitted (Ruseffendi, 1985).

The problem is how to optimize the capacity of the tertiary institutions so that the output will be increased. The World Bank predicted that for the years 1978 to 1990, Indonesia will require thousands of additional engineers, scientists, agriculturalists, accountants, and economists. These requirements exceed present tertiary institution output by at least 61% (USAID, 1982, p. 48).

The third problem is the under-representation of female students at tertiary institutions in the exact sciences. Two surveys, of the
state university and all state institutes in Bandung showed that in
1984 less than 24% (2971 of 12,589) and in 1985 less than 23% (3640
of 15,922) of students in the exact sciences such as mathematics,
sciences, agriculture, engineering, and mathematics and science
education were women. In 1985, an additional survey of a well
known private university in the city found less than 16% (260 of
1657) of engineering students were women (Ruseffendi, 1984c, 1985).

Table 1 shows that in 1982, controlled by the Department of
Education and Culture, the number of elementary school students was
23,862,488, the number of junior high school students was 3,736,020,
the number of senior high school students (non college-bound
students, exclusive) was 1,286,464, and the number of university
students was 504,000. These numbers are: 81.2%, 12.7%, 4.4%, and
1.7% of the sum respectively.

Taking the number of female students at the tertiary and lower
levels, and based on the fact that the number of females in
Indonesia in 1982 exceeded males by 0.5%, let us assume that the
numbers of female and male students in elementary schools in 1982
were the same. Assume also that 47.6% of junior high school
students, 23% of senior high school students taking mathematics and
science streaming (compared to 43.6% overall female enrollment), and
22% of university students enrolled in the exact sciences (compared
to 34.5% overall female enrollment) were females (data from Bandung
in 1985) can be generalized. The comparison of female and male
students is shown in Figure 6.
Elementary School Students (81.2%)  

***  **  *  

10  

20  

30  

40  

50  

60  

70  

80  

90  

100  

***  = Junior High School Students (12.7%)  

**  = Senior High School Students (4.4%)  

*  = University/Institute Students (1.7%)  

= Female Students  

= Female students taking exact fields  

= Male students  

Figure 6. Female Students' Participation in Exact Sciences Compared to Male Students in Elementary School, Junior High School, Senior High School, and Universities and Institutes in Indonesia
It can be concluded that female students at tertiary institutions in the exact sciences are under-represented.

The Role of Women in Indonesia

The following discussion on the role of women in Indonesia will be divided into three parts: the political status of women and the involvement of the government, women's organizations, and the role of women in society.

Political Status of Women and Government Involvement

On August 17, 1945, Indonesia proclaimed its independence. The next day, the Indonesian Constitution was decreed. It declares that all citizens shall have equal position in law and government. This means that Indonesian women and men have equal political rights and status, and equal pay for equal work.

An Associate Minister for the Role of Women was appointed in 1978 to make policy, plan, coordinate, monitor and evaluate women's programs in development at the national level. In 1983 the function of the Associate Minister was elevated to Minister of State for the Role of Women. This is in line with the Guidelines of State Policy that concern women. The Guidelines proclaim, "Overall development requires maximum participation of men and women in all fields. Therefore, women have the same rights, responsibilities, and opportunities as men to fully participate in all development activities." (Murdati et al., eds., 1985, p. vii). The primary roles of the Minister are:
(1) "to prepare and plan the formulation of government policies pertaining to the enhancement of the role of women in all fields of development,

(2) to coordinate all activities in order to achieve a cooperative, balanced and integrated efforts in its overall implementation,

(3) to coordinate the operational activities of various government institutions and agencies concerning programs on the enhancement of the role of women in all fields,

(4) to submit reports, information and recommendations concerning the enhancement of the role of women in all fields of development." (Country Report, 1985, p. 14).

Women's Organizations in Indonesia

The machinery for policy making, planning, and implementation of women's programs through the Minister of State for the Role of Women is supported by women's organizations. Some of the organizations were working long before the existence of the Ministry. The activities of the organizations involve women not only from the cities, but also from the villages. Some of the primary non-governmental organizations are:

Indonesian Women's Congress - KOWANI

- a federation of non-governmental women's organizations
- national, comprising social, political, religious, and professional groups
- established in 1928
objectives: to improve the multiple function of women as wife, mother, community member, wage earner, and citizen
- a member of the ASEAN Confederation of Women's Organizations and of the International Council of Women.

Government Civil Servants Wives' Association – Dharma Wanita
- an organization of the wives of civil servants and women civil servants
- has 9910 units and sub-units spread out over the country
- established in 1974
- objectives: to support government programs such as functional literacy and family planning
- has established schools (6065 kindergartens, 64 elementary schools, 66 junior high schools, 24 senior high schools, and 28 schools for the handicapped)
- has won the HONORABLE MENTION OF NOMA PRIZE OF UNESCO in 1981
- has protected the rights of wives and children of civil servants.

Armed Forces Wives' Association – Dharma Pertiwi
- an organization of wives of Armed Forces personnel
- contains as subgroups the Army Wives' Association (Persit Kartika Chandra Kirana), Navy Wives' Association (Jalasenastri), Air Force Wives' Association (PIA Adhya Garini), Police Wives' Association (Bhayangkari), and Armed Forces Family Welfare Association (Ikatan Kesejahteraan Keluarga ABRI)
- Established in 1964
- Objectives (in part): to advance and affirm the welfare, sense of belonging and integrity, and national awareness of the wives of Armed forces staff
- Published a magazine on its activities with an annual circulation in the thousands of copies
- Has built and managed at least 1400 kindergartens, elementary and secondary schools with a combined enrollment of over 175,000 students.

Family Welfare Movement - PEMBINAAN KESEJAHTERAAN KELUARGA (PKK)
- National, integrated organized movement for all programs and activities for the enhancement of the role of women
- Has a managing Board of Officers that enables the PKK to carry out its programs and activities as the grassroots level and coordinate these programs with government programs
- A Board of Officers is centered at each level of the government administration and headed by the wife of the administrative official
- A volunteer organization
- Established in the mid-1970s
- Objectives: to improve family welfare, emphasizing women as the main figure in the family.

The Indonesian National Commission on the Status of Women -- KOMISI NATIONAL KEDUDUKAN WANITA INDONESIA (KNKWAI)
- a semi-governmental autonomous body consisting of 45 members who represent non-government, government, and private organizations
- members are required to master at least one foreign language used by the United Nations as a condition for membership
- annually subsidized by the government
- established in 1968 by decree of the Minister of the State for People's Welfare as a response to the recommendation of ECOSOC of the United Nations
- objectives: conducting research and studies concerning the status of women; providing proposals, suggestions, and recommendations to the government; participating actively in various activities concerning the status of women, such as conferences, seminars, and workshops at national, regional, and international levels; publishing booklets, brochures, and other materials concerning the role and status of women (ibid, pp. 60-61).

The Status and Roles of Indonesian Women in Society

By law, Indonesian women and men have equal political rights and status. Women, as well as men, have been involved in society in politics and leadership, defense and security, education and research, health, mass media and journalism, labor, and even in space exploration.

Some Indonesian women participate actively in politics and leadership. Women constitute about 10% of the members in the DPR
(House of People's Representatives) and 7.5% of the members in the MPR (People's Consultative Assembly). There are currently two female ministers, one female ambassador, seven female judges in the Supreme Court, one female director general, and one woman in the Supreme Advisory Council. In several departments, women possess key positions such as directorships and middle management positions. Even in the villages, where women usually are housewives, 34 women have been elected as village heads (ibid, pp. 22-23).

Women can join the Armed Forces Women's Corps, consisting of the Army Women's Corps (KOWAD), the Navy Women's Corps (KOWAL), the Air Force Women's Corps (WARA), and the Police Women's Corps (POLWAN). Forty-nine candidate officers graduated from the first school for candidate officers in 1962. Women in the corps do not assume men's jobs such as combat duty, but rather enrich the defense and security functionally. Women who serve in the police corp have such duties and drug control and combatting juvenile delinquency.

There is no sex-based discrimination in education. Elementary, secondary, and tertiary education is open to females. In 1980, the percentage of female students in the total school population was 46.3% (ibid, p. 35). After graduation, women can choose any job they like based on their previous education and abilities. Data shows that in Bandung in 1985, 53.8% of the teachers in public junior high schools were female, as were 49.2% of the teachers in public senior high schools. Many women have become faculty members in tertiary institutions. Some have been deans of colleges or
chairpersons of departments. Currently, Indonesia has at least one female Rector (President of a university or institute) (Ruseffendi, 1985).

Women play an important role in health development and services. A woman may be a physician, dentist, Pharmacist, nurse, or a midwife. In 1983, about 45.9% of health workers were women. Women comprise 27.4% of the physicians, 64.3% of the dentists, 47.9% of the pharmacists, 54.6% of the paramedics, and 34.5% of the non-mendical (Country Report, appendix II/4).

Indonesian women has been active in mass communication media and journalism. Many news readers in radio and television are women. Some of them are interviewers. Some women are journalists. However, the portion is still small. In 1981, there were 88 female journalists (against a total of 2700) registered as members of the Indonesian Journalist Association (Murdiati et al, eds., 1985, p. 88).

In the 1980 census, 36.5% of the female population were in the labor force. Most of them, especially in rural areas, had inferior social status. They work in agricultural production, home industries, small trades, food products, weaving and spinning mills, and services.

Indonesia was one of the countries asked by NASA to provide a space shuttle crew member to accompany a proposed launch in 1986. Four applicants were chosen as finalists. The final choice was Dr. Pratiwi Pujilestari, a woman.
More than 87% of the Indonesian people are Moslem. In some areas, such as West Java, the percentage is greater, (in West Java 98% of the people are Moslem). Has the Moslem culture affected women's participation in mathematics?

It seems that it has not been influencing their participation. It it has, the influence appears very small. First, Indonesia is not an intensely religious country; it is not like Iran, Saudi Arabia, or Pakistan. In public schools female students do not wear veils, and are not segregated from male students. They have the same rights and opportunities as male students. In society, women have the same rights and opportunities as well. By law, women and men have equal political rights and status, and equal pay for equal work. With regards to elementary education, USAID (1982) observed that Indonesia has achieved success in sexual equality (p. 8).

Secondly, Islam does not consider women as the second citizen. It places them proportionally and functionally instead. For example, since women in general are physically less strong, the Holy Qur'an says that men should be guardians of women (Ahmad, 1970). The Holy Prophet of Islam has said that paradise lies at the feet of the mother, the seeking of knowledge is obligatory for both men and women, and the best of men is he who is best to his wife (Ahmad, 1970; Bashir, 1961).

Third, the Indonesian government has been trying to strengthen women's role in society. For example, the Act of Marriage No. 1, of 1974. Based on Islamic regulation, a man may have more than one
wife, up to a maximum of four under certain conditions. Among these conditions are:

1. The husband should have permission from his current wife (or wives);
2. the husband ought to treat and love the wives justly and equally;
3. the husband is able to afford them;
4. if it is needed physically by the husband or conditionally by the situation.

In reality, the rights of women have been impaired markedly during the past decades. It has been hard for a divorced wife to bring a misbehaving husband to court to enforce the conditions of the divorce. In 1974, the government issued the Act of Marriage No. 1 1974, saying that the basic principle of marriage is monogamy; polygamy by law is an exception. It means that before entering a polygamous marriage, a husband has to have the approval of his previous wife (wives) and consent from a court of law. Divorce cannot be instituted unilaterally by the husband. A wife has the same rights to litigate for divorce. Indeed, the implementation of the Act of Marriage No. 1 1974 has strengthen the status of Indonesian women in marriage.

Since the day of Indonesia's independence, women have the same rights and status in society, education, politics, jobs, and marriage that men do. Indonesian women have organizations that can bring about activities and programs for enhancing women's roles and
status in development. Even the government has been involved by providing the Minister of State for the Role of Women.

In short, some of the roles of Indonesian women are:

1. Attending regional, national or international meetings, as individuals or representatives of the government, or women's and wives' organizations.
2. Being active in the wives' organizations.
3. Attending school through university level.
4. working in the field or offices, or joining the Armed Forces Women's Corps.
5. Being a homemaker.

Background for the Study

Mathematics is taught in school because it is important. Fennema and Meyer said, "From computation skills to high level problem solving, mathematics is increasingly a prerequisite for full participation in our technical society." (1985, p.1).

Unfortunately, in Indonesia, the United States, and many other countries, many students, especially females, have avoided participating in mathematical activities.

Many activities need mathematics, such as schooling, going to a university, doing business, or doing mathematics and statistics. It is almost impossible to be involved in such activities if one does not have a minimum knowledge, ability, and skill level in mathematics. A person could not choose such occupations as scientists, mathematician, statistician, economist, architect,
educator, medical doctor, or mathematics teacher without mathematics. Opportunities in these fields will be lost if mathematics courses are avoided. Developing countries such as Indonesia will not have the needed numbers of scientists and mathematicians for business, industry, or science.

To see how female students in Indonesia participate in mathematical activities, two surveys have been conducted; the first in 1984 and the second in 1985.

In 1985, data from more that 82% of the public senior high schools in Kodya Bandung (the city of Bandung) show that there were 19,292 students and 768 teachers, of whom 43.6% of the students and 49.2% of the teachers were women. But only 29.6% of mathematics teachers were women. About 58.8% of 12,094 students were taking the mathematics and science stream, but only 39% were females (Ruseffendi, 1985).

Data of two surveys of all the state institutes and the university in Bandung are shown in Table 2.

Data in Table 2 show that in the Institute of Technolgy Bandung, in 1984 and 1985, 31.0% of about 660 students majoring in mathematics were females, and only 13.8% of the mathematics faculty members were women. In the Padjadjaran University, in 1984 and 1985, 24.4% of about 440 students majoring in mathematics were females and only 15.5% of the mathematics faculty members were women. And in the same years, in the Institute of Teacher Training and Educational Sciences Bandung, for the S1- program, 32.2% of
Table 2
Numbers of University Students Majoring in Mathematics and Female Faculty Members in Bandung, 1984 and 1985

<table>
<thead>
<tr>
<th>Institute/University</th>
<th>Students</th>
<th>% of Females</th>
<th>% of Female Faculty Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITB</td>
<td>323</td>
<td>28.5</td>
<td>33.3</td>
</tr>
<tr>
<td>UNPAD</td>
<td>243</td>
<td>15.2</td>
<td>35.5</td>
</tr>
<tr>
<td>IKIP</td>
<td>234</td>
<td>34.7</td>
<td>29.9</td>
</tr>
</tbody>
</table>

Note:
1. ITB - Institute of Technology, Bandung
2. UNPAD - Padjadjaran University
3. IKIP - Institute of Teacher Training and Educational Sciences

Sources: Ruseffendi, 1984, 1985
about 480 students majoring in mathematics education were females and only 6.1% of the mathematics faculty members were women (for S1 and diploma programs, 37.2% of about 550 mathematics education students were females) (ibid., 1984c, 1985).

This pattern, however, does not occur in the lower grade level. For example, in 1985, data from more than 82% of public junior high schools in Kodya Bandung (the city of Bandung) show that there were 30,234 students and 1082 teachers. Of this population, 47.6% of the students were females and 52.2% of the mathematics teachers were women (ibid., 1985). Junior high school students, and tenth grade students at the senior high school are not streaming yet; all of them, in each grade, have taken almost the same mathematics courses. It seems that female under-representation in mathematical activities is age related.

The United State of America, a country where research on women and mathematics is quite advanced, shows similar characteristics for enrollment in mathematics. Mathematics courses in American high schools continue to attract fewer females than males; high school females tend to avoid taking mathematics (Becker, 1981), but this is not the case with junior high school students (Armstrong, 1981). This avoidance has contributed to women's low participation in scientific and technical fields (Armstrong and Price, 1982).

In many countries there has been no research of interest on women and mathematics. In countries such as England and Wales, Australia, Israel, Canada, and New Zealand, males show a greater
interest in mathematics than do females (Schildkamp-Kündiger, 1982). Lower participation could cause lower performance in the subject.

There are sex-related differences in mathematics. These differences appear to be greatest in high school or beyond. There are different arguments explaining the differences: age, difference in amount of mathematical training, attitudinal or affective factors, attributional factors, and genetics.

Fennema and Sherman (1978) said that many researchers have concluded that male superiority in mathematics achievement is almost always found. But, many are currently suggesting that sex-related differences in mathematics achievement are not as has been believed and are age-related (p. 189). Mayer concluded, "Thus, there is an apparent trend in which sex differences in mathematical performance depend on age." (p. 377)

Some researchers hypothesize that sex-related differences in mathematical performance could be due to the taking of different mathematics courses. Pedro et al. said, "This differences in the amount of mathematics taken has been cited as a major explanation of sex-related difference in adults' mathematics performance..." (1981, p. 207). Fennema and Meyer said, "Perhaps females, as a group, just do not learn enough mathematics to enable them to participate in..." (1985, p. 3).

Many researchers suggest that differences in mathematics achievement between female and male students in high school are not
sex-related, but caused by other factors such as both sexes tending
to view mathematics as a male domain (Sherman, 1976); affective
factors (Fennema and Sherman, 1978), or attributional factors
(Wolleat, Pedro, Becker, and Fennema, 1980). On the other hand,
Benbow and Stanley (1980, p. 1264) suggested, "We favor to the
hypothesis that sex differences in achievement and attitude toward
mathematics result from superior mathematical ability ..."

Fennema said, "Several beliefs about sex related differences are
currently being discussed widely. Among them are:

- Females are not as good at math as males.
- Females lack confidence in learning mathematics.
- Females attribute their own success in math to others.
- Females don't believe math is useful.
- Females don't take advanced mathematics courses in either
  high school or college." (1982, p. 14)

Mathematics is a useful subject both for continuing study or for
working on a job. To master it, one needs full participation.
People's attitudes toward mathematics should be more positive. Both
males and females, in a country like Indonesia, with a huge
population, and lack of scientists, should participate fully in
mathematical activities for development. If there is something
wrong with the activities themselves, this should be corrected.

The facts and research results indicate:

1. Indonesian females' participation in mathematical activities
   is small.
2. The research results, in sex-related differences in mathematics in the United State of America cannot be generalized to answer the same questions in Indonesia since:

- The Fennema and Sherman study in grades 6 and 8 (1978) found sex-related differences for only two of eight affective variables, confidence and male domain variables (Suydam and Weaver, 1981, pp. 1-3).

- In the United States, 9th and 10th graders are heterogeneous in ability and they might have taken different mathematics courses. Fennema and Meyer said, "...by the time learners graduate from high school, boys have learned more mathematics than girls." (1985, p. 4). Whereas, in Indonesia, the 9th and 10th graders are considered to be more able students because they have been academically selected by at least a kind of Regent Elementary School Examination. Almost all of them have taken the same mathematics courses.

- In the United States, motivation for taking mathematics or participating in mathematical activities for women would be hampered by sex-related differences in opportunity. Fennema and Meyer said, "Women are ... not receiving either the status or the salaries that should..." (1985, p. 3). Why should one (female) take a harder area of study if she would receive a lower salary than a male taking the same coursework? Whereas, in
Indonesia, that kind of sex difference does not exist. As has been mentioned earlier, Indonesian women and men enjoy, by law, equal political rights, equal pay for equal work, and equal status.

3. In the United States of America, there is still disagreement among the experts concerning the cause of the difference in achievement and attitudes toward mathematics.

Based on the facts and research results mentioned above, a further study in Indonesia should be done. How do female students' and the male students' mathematics performances compare at the junior and senior high school levels. How do female students' attitudes toward mathematics compare to male students' attitudes? If females' and/or males' attitudes toward mathematics are negative, a change to a more positive attitude should be encouraged, since having a positive attitude toward mathematics is very important. Fennema said, "Most people accept that statement without hesitation, and indeed, much research shows that specific attitudes and learning mathematics are related." (1982, p. 12) A positive attitude toward mathematics is one of the variables that have the greatest effect on participation in mathematics (Armstrong, 1985).

It is not important to seek to determine which sex is superior in mathematical ability, but to optimize both female and male participation in mathematical activities so that their contribution to human life is more beneficial. Based on females' characteristics, there are many jobs such as medical doctor,
chemist, dentist, and teacher that may be more suited to women than men. For example, in Indonesia, the National Assessment of sixth graders in 1975 found that female teachers have higher achieving pupils in all subjects than do male teachers (USAID, 1982, p. 3).

The study is important because research about women in Indonesia is rare (ibid, p. 4). Schildkamp-Kündiger (1982) said that some countries are not interested in the study of gender and mathematics. In the United States, such study is well advanced, with the United Kingdom next. The gap between the countries and others is considerable. In Indonesia, the 1983 Guidelines of State Policy stipulate the role of women in development, coordinated by the Minister of State for the Role of Women. The impact of the research results would be beneficial for many people since Indonesia is a country where the population is large, and university graduates such as mathematics teachers, engineers, scientists, agriculturalists, accountants, and economists are needed.

Statement of the Problem

There are three major concerns in this study. The first is to compare female and male students' mathematical performance. Are they different or approximately the same? The second is to determine if females' attitudes in learning mathematics, as measured by the Fennema-Sherman Mathematics Attitude Scales, are different from males' attitudes. If there are differences, what causes them: teachers, parents, peers, tradition, genetics, or themselves? To describe more specifically females' attitudes toward mathematics
compared with males'. The third problem is to develop models, as a set of suggestions and recommendations, to make possible a more positive attitude toward mathematics for both female and male students.

The objectives of this study are:
1. To compare females' and males' performance in mathematics.
2. To reveal male and female students' attitudes about mathematics.
3. To develop a set of suggestions that could be used to change attitudes in a more positive direction.

Assumptions and Limitations

Assumptions

The small number of women that participate in mathematical activities could be because women and men are unequal; either there are fewer women, or women have lower mathematical ability, or both. In this study it is assumed that the number of women and men in Indonesia is approximately the same. Also, their mathematical abilities are assumed to be about the same.

There are two reasons for these assumptions. First, in Indonesia in the 1961, 1971 and 1980 Population Census, and in 1981, 1982, and 1983, based on the 1980-2000 Population Projection, the number of females exceeded the number of males by about 1.4%, 1.4%, 0.6%, 0.5%, 0.5%, and 0.5% respectively (Statistical Yearbook of Indonesia 1983, 1984, pp. 47, 49). Second, Indonesian females' and males' mathematical abilities have not been compared and in the
United States, there is still disagreement among experts on the equity of females' and males' abilities in mathematics.

**Limitations**

Sampled in the study were 3rd graders of junior high school (equivalent of 9th graders in the United States) and 1st graders of senior high school (equivalent of 10th graders in the United States). To be a 10th grader, first a 9th grader usually must pass two kinds of examinations: the National Assessment of Junior High School Achievement and the Entrance Examination for Senior High School. Second, acceptance is based on classroom availability; the better the score, the better the chance. The 9th and 10th years are the important years for the pupils because, in Indonesia, the pupils enter the main streamings in science and mathematics, social sciences, languages, religion, or culture that will leading to enrollment in a university, academy, junior college or diploma program. Any student who has been streamed into non-science and mathematics areas has no opportunity to be a medical doctor, a dentist, a chemist, a mathematician, a statistician, an engineer, a biologist, an agriculturalist, or a mathematics teacher. Prior research indicates that the period which concludes junior high school and begins senior high school, is a critical age when attitudes affect both achievement and career choice. Fennema said, "The middle school years appear to be crucial ones in the development of these sex-related differences." (1982, p. 12)
To compare females’ and males’ performance in mathematics, two groups of students were assessed. The first group were junior high school 3rd graders and the second group were senior high school graduates. The instrument used to assess the junior high school students was a mathematics instrument that had been used in the National Assessment of Junior High School Achievement and the instrument to assess the others was a mathematics instrument that had been used to select the applicants to Colleges of Science and Mathematics Education, Institutes of Teacher Training and Educational Sciences. Both instruments were compiled by the central government. Due to security, the instruments are not available; however, an example of a local assessment instrument to measure junior high school students' performance in mathematics is included in Appendix A. It is comparable to the instrument used by the central authority.

The junior high school subjects were picked randomly from the population. The senior high school graduate subject pool, however, represented science and mathematics education applicants to an IKIP only; not from other universities or institutes. Generalizations from the data from this latter group should be made cautiously.

The instrument used to examine students' attitudes toward mathematics is the Fennema-Sherman Mathematics Attitude Scales. The instrument is used to reveal:
- females' and males' confidence in learning mathematics
- females' and males' anxiety for mathematics
females' and males' awareness of mathematics usefulness
females' and males' perceptions of mathematics as a male domain
females' and males' attitudes toward success in mathematics
females' and males' effectance motivation in learning mathematics
females' and males' perceptions of mathematics teachers' attitudes of pupils' participation and abilities in mathematics.
females' and males' perceptions of father's attitudes toward his children's participation and abilities in mathematics.
females' and males' perceptions of mother's attitudes toward her children's participation and abilities in mathematics.

There are two other attitude scales, life expectation and teachers' attitude scales. The life expectation scale is used to measure females' and males' life expectations, whereas teacher's attitude scales are used to measure mathematics teachers' attitudes toward their students in learning mathematics.

Two persons or groups of persons having the same mathematics abilities and attitudes toward mathematics could have different life expectations. Someone with something or someone to depend on in the future may be less motivated to achieve in study or life than someone without that expectation. Indonesian women, many of whom are housewives dependent upon their husbands, are suspected of having a less positive life expectation. The female students' are
suspected to have been influenced to have a less positive life expectation. This scale would be especially useful to measure sex-related differences in life expectation if females' and males' performance in mathematics and attitudes toward mathematics are approximately the same. In the pilot study, females' and males' attitudes toward mathematics were not significantly different. If females' mathematics performance and attitudes toward mathematics were the same as males', their less positive life expectations could explain their low participation in mathematics. The instrument to measure life expectation is a self-made scale.

The teachers' attitudes scales are used to measure mathematics teachers' attitudes toward their female and male students' participation in mathematical activities, to see if they differentiate between female and male students. This instrument is a modified version of the teacher scale of the Fennema-Sherman Mathematics Attitude Scales.

**Definition of Terms**

**Attitude** is an organization of several beliefs focused on a specific object or situation predisposing one to respond in some professional manner (Rokeach, 1972, p. 159).

**The Confidence in Learning Mathematics Scale** is intended to measure confidence in one's ability to learn and perform well in mathematical tasks (Fennema and Sherman, 1976a, p. 4).
The Mathematics Anxiety Scale is intended to measure feelings of anxiety, dread, and nervousness and associated bodily symptoms related to doing mathematics (ibid, p. 4).

The Mathematics Usefulness Scale is designed to measure students' beliefs about the current usefulness of mathematics and in relation to their future education, vocation, or other activities (ibid, p. 5).

The Mathematics as a Male Domain Scale is designed to measure the degree to which students see mathematics as a male, neutral, or female domain (ibid, p. 3).

The Attitude toward Success in Mathematics Scale is designed to measure the degree to which students anticipate positive or negative consequences as a result of success in mathematics (ibid, p. 2).

The Effectance Motivation Scale in Mathematics is intended to measure effectance as applied to mathematics (ibid, p. 5).

The Teacher Scale is designed to measure students' perceptions of their teachers' attitudes toward them as learners of mathematics (ibid, p. 4).

The Father/Mother Scale is designed to measure students' perception of their father's/mother's interest, encouragement, and confidence in the student's ability (ibid, p. 3).

The Life Expectation Scale is designed to measure the degree to which students see the life of a married couple as the husband's, husband's and wife's, or wife's responsibility.
The Teachers' Attitudes Scale is designed to measure the degree to which teachers discriminate between females and males in mathematics.

The National Assessment of Junior or Senior High School Achievement is a national, state examination.

Junior High School is a secondary school for 7th, 8th, and 9th graders.

Senior High School is a secondary school for college bound students in the 10th, 11th, and 12th grades.

Tenth graders are senior high school students that have not been grouped into the main streaming.


DGHR is the abbreviation of the Directorate General of Higher Education of the Republic of Indonesia.

IKIP (Institute Keguruan dan Ilmu Pendidikan) means Institute of Teacher Training and Educational Sciences.

PTPG (Perguruan Tinggi Pendidikan Guru) is the original name of the IKIP; it was founded in 1954, whereas IKIP was formed 10 years later.

Kodya Bandung means the municipal or city area of Bandung.

GIA is the abbreviation of Garuda Indonesian Airways; the name of the Republic of Indonesia's airline.
USAID is the abbreviation of United States Agency for International Development.

Hypotheses

USAID (1982) cited a research result of Indonesian elementary school students' achievement in different school subjects. In 1975, girls' mathematics achievement was slightly higher than boys' (p. 9).

Based on the problems, assumptions, and previous research, there are two main hypotheses:

1. Female and male students' performance in mathematics are the same.
2. Female students' attitudes toward mathematics are less positive than male students' attitudes.

There are two minor hypotheses:

1. Mathematics teachers' attitudes toward female and male students are the same.
2. Female students' life expectations are less positive than male students'.

Overview of the Following Chapters

The first chapter has discussed the objectives of the study, the importance of the study, the assumptions and limitations, and the supporting factors that could motivate the implementation of the study.

The second chapter describes the important research results on females' participation in mathematical activities, females'
abilities and performance in mathematics, and females' attitudes toward mathematics compared to males'. The third chapter deals with the methods and procedures, such as the description of the subjects, design of the survey, instruments, and the procedural steps in the study. The fourth chapter is the study itself: population, sample, place of the study, and the statistical measures used. The last chapter contains recommendations. The recommendations include a model or suggestions to be used by Indonesian parents, mathematics teachers, and students for improving students' attitudes toward mathematics.
CHAPTER II

REVIEW OF LITERATURE

This chapter reviews studies of women's participation in mathematical activities, women's performance in mathematics, and their attitudes about mathematics.

Women's Participation in Mathematical Activities

Participation means studying, teaching, using, or having a degree in mathematics. Participation in mathematical activities means majoring in mathematics in school or university, having a degree in mathematics, teaching mathematics, or working in a field that uses a lot of mathematics. This reveals women's participation in mathematics around the world. Based on Keeves' survey in 1973, Schildkamp-Kündiger concluded that men show a greater interest in mathematics than women in most countries and at most age levels (1982, p. 8).

Women of Indonesia may participate in mathematical activities such as majoring in mathematics or mathematics education, becoming mathematics teachers in high school, or becoming mathematics faculty members in institutes and universities. This participation is small. Thus, it is similar to the situation in the United States and most other countries.

In the United States, Chipman and Thomas (1985) said that in the 1960 Project TALENT sample, 33% of the males had taken four years of high school mathematics but only 9% of the females had. Twenty percent of the males but only 10% of the females, who had originally planned to enter mathematics-related careers were in such careers at age 29 (pp. 6, 7). In the National Longitudinal Sample, in 1972 about 39% of the males and 22% of the females in 12th grade had taken four years of high school mathematics (ibid, p. 6).

In Australia, a consistent trend throughout the country has been for females to drift from mathematics enrollment in secondary schools. Females tend to take the lower levels of mathematics. They prefer competing in English competitions, whereas males prefer to compete in mathematics competitions. Many females in the state of South Australia drop mathematics when that option becomes open to them (Shelly, 1982, pp. 18, 22, 23).

In nine of ten provinces in Canada, the portion of female teachers who teach mathematics and science in secondary schools varies between 13% and 35%. The 1979-1980, the percentages of women earning a bachelor's degree, a master's degree, or a doctorate in mathematics and physical sciences were respectively 28%, 19%, and
10%. Only 4.2% of full-time university faculty members in mathematics and physical sciences were women (MURA, 1982, pp. 33-34).

In Israel there is no substantial difference between genders in enrollment in mathematics at the primary school level. Differences appear at the secondary school level and beyond: more females than males took the less demanding mathematics programs. Females tended to avoid specializations that required advanced mathematics. Only 38% of the university students studying mathematics were females. In the academic year 1979/1980, the number of degrees in mathematics awarded to females by all universities in the country were: 50% (180 of 357) of bachelor's degrees, 32% (21 of 65) of master's degrees, and 26% (8 of 31) doctoral degrees (Lewy, 1982, pp. 81-83, 86).

In New Zealand, all children up to junior secondary school, forms 3 and 4, take the same mathematics courses. Beginning in senior secondary school, New Zealand experiences the same problem: females do not continue with enrollment in mathematics. Enrollment in mathematics of sixth and seventh form females declines. At the tertiary level in 1980, 66% of the female students took degrees in the arts but only 32% took degrees in science, and 3% took degrees in engineering. In 1980, the female mathematics faculty members in Primary Teachers Colleges, Secondary Teachers Colleges, and Universities were 8%, 25%, and 8% of the total faculty respectively (Wily, 1982, pp. 92, 94, 96).
Thus, in all of the countries reported, women's participation in mathematical activities is small. Is it because of achievement, attitude, society, pressures, or life expectations? No country reports higher female than male participation in mathematics.

**Women's Performance in Mathematics**

Low participation of women in mathematical activities could be because their performance in mathematics is poorer than males.

In Indonesia, the National Assessment of 1975 was the most rigorously formulated and widely administered test of educational quality. Questions in science, mathematics, social studies, and Bahasa Indonesia were given to 14,000 students in grade 6 throughout the country (USAID, p. 3). Females' achievement in mathematics on the sixth grade test was slightly higher than males (ibid, p.9).

Based on Keeves' study in 1973, Shelly said that in Australia, for all comparisons made between the scores of males and those of females in mathematics and science, males performed better than females (1982, p. 18). A few studies in the Dominican Republic showed that male achievement in mathematics was better than female achievement. The difference was statistically significant (Luna R. and Gonzalez, 1982, p. 54). In Israel, the study of Lavi compare the scores of male and female applicants on their entrance examinations to two universities. Lavi found considerable sex differences in mathematics, favoring males. The Lewy and Chen longitudinal study for 4th, 5th, and 6th graders showed that the average scores in mathematics of students whose parents immigrated
from developing and developed countries were higher for the males than for the females (Lewy, 1982, 84-85).

In New Zealand, no significant sex difference in the performance of mathematics at the primary levels appears. For the 1980 School Certificate in mathematics for high school graduation, more males received grades A and B and more females received grades C and D. The difference, however, was small (Wily, 1982, pp. 92-94). In England and Wales, up to the end of elementary school (age 11), the males' and females' attainment in mathematics are almost the same. But, by the end of compulsory education (age 16), especially in the higher grade O-level and A-level examinations and beyond, females' attainment in mathematics has fallen behind males' (Isaacson, 1982, pp. 62-63). The Cockcroft Report says, "It is not easy to establish why females should perform less well than males at mathematics..." (1982, p. 62).

Similar results are reported for the United States of America. Fennema and Sherman say that many researchers have concluded that male superiority in mathematics achievement is almost always found (1978, p. 189). Maccoby and Jacklin (1974) summarized the findings of many studies on sex differences in mathematical ability of different age groups from 3 to 21. For the first group (ages 3-8), typically there were no differences between average scores for males and females. If there were, they favored females. For the second group (ages 9-12), mainly there were no differences either, and if there were, the males scored higher than the females. For the third
group (ages 13-21), in most studies, males scored higher than the females.

Marshall (1980), examined the data from standard mathematics achievement tests of grades 3, 6, and 12 given in California public schools. He made similar conclusions: at grade 3, the average score of females was slightly higher than the males, at grade 6, males' average score was slightly higher, and at grade 12 males' average scores were essentially higher. Fennema and Meyer said, "There are sex-related differences in mathematics. These differences appear to be minimal in the elementary school, increase in the secondary school, and largest and most evident in post secondary education and adult life." (1985, p. 3).

Data recorded from the countries in this study mostly show that sex-related differences in mathematics exist. The higher the grade, the larger the difference. It appears age-related. Is it due to genetics, course-taking, attitudes, or life expectations?

**Attitudes Toward Mathematics**

Males' mathematics performance and participation may be higher because of any of several reasons:

1. genetic factor--males' ability in mathematics may be higher;
2. background factor--males may have a stronger background in mathematics;
3. interest factor--males are more interested in mathematics;
4. reality of future career factor—males may have more awareness that mathematics is useful for their future careers;
5. belief factor—males may have stronger belief in themselves;
6. motivational factor—males may have received more motivational pressures from outsiders (parents, teachers, school organizations, curricular differences, or sexism in textbooks or society).

In other words, higher performance and participation by males may occur because of differences in cognitive variables, affective or attitudinal variables, or social environment variables. These variables may be interactive. Each of these variables is discussed below with reference to attitude.

**Cognitive Variables**

Ability and a strong background in mathematics seem to be primary factors affecting performance and participation in mathematics. Sherman (1980) found the cognitive variable is the strongest predictor in continuing study of mathematics.

Male superiority in mathematics performance and participation may be due to a genetic or biological factor. However, in an extensive study of the literature in this area, Sherman (1977) found that most of the hypotheses used had little explanatory power. The sex differences in academic functioning are small.

Sex differences in mathematics favoring males could be because of an unequal mathematical background; males usually have studied
more mathematics than females. To explore the validity of this theory, Fennema and Sherman (1977) studied sex differences in achievement, mathematics experience, affective factors, and the like for about 1200 high school students. It was expected that males' scores would be higher than females' scores in mathematics achievement tests. When the statistical analysis controlled for course enrollment, sex differences favoring males were reduced. Fennema and Sherman concluded that if relevant factors are taken into account, then male superiority in mathematics does not occur often, and, if it does, it is small.

Benbow and Stanley (1980) found male superiority in mathematics achievement in another study that covered the six years from 1972 to 1979. Almost 10,000 academically talented junior high school students with the same background in mathematics were studied. Benbow and Stanley argued against Fennema and Sherman's conclusion that sex differences in mathematics achievement favoring males resulted from different backgrounds in mathematics. They favored the hypothesis that the differences of mathematics performance and attitude toward mathematics are due to superiority of males in mathematics ability.

It can be concluded that cognitive variables are important for continuing study. But it is still debatable what causes it—genetics or environment. Since Fennema and Sherman's sample was heterogeneous in ability and Benbow and Stanley's sample was talented, it would be worthwhile to see how the differences would be
for students, such as Indonesian students, who take the same mathematics courses and are more homogeneous in ability.

**Affective Variables**

A positive attitude toward mathematics, regardless of mastery level, should be one of the main outcomes of mathematics education. It is likely that a person whose attitudes toward mathematics are positive would more likely to enjoy mathematics, would take more mathematics, and would achieve more than a person whose attitudes toward mathematics are negative. "The contention that favorable attitudes produce favorable learning seems axiomatic." (Dessart and Suydam, 1983, p. 23). Crosswhite (1972) found that correlation between attitude and achievement is positive, but low. Armstrong (1985) reported that positive attitudes toward mathematics was one of three variables that had the greatest effect upon participation in mathematics.

Students' attitudes toward mathematics in England and Wales reported by Isaacson were based on Preece's study. Preece studied 1250 secondary school children aged 12-13 on their attitude toward mathematics. The overall attitude scores for the males increased slightly while those of the females dropped. Females' career choices were affected significantly by their attitudes toward mathematics (Isaacson, 1982, p. 61).

In Israel, based on Lewy and Chalfon's comprehensive 1973 survey of attitudes toward school subject, Lewy concluded that males' positive attitudes toward mathematics were higher than females at
all grade levels. The differences are higher at the higher grade levels than at the lower grade levels (1982, pp. 86-87).

Females' attitudes toward mathematics in New Zealand seem to be balanced (Wily, 1982, p. 93). Wily cited Clark's study of senior primary children, a pilot study restricted to primary and intermediate schools, and Ngee's study at the university level. In Clark's study, children's attitudes toward mathematics were very favorable, with no significant sex differences. In the pilot study, males' attitudes in the mathematics usefulness portion were more positive. In Ngee's study, however, first-year female students enjoyed the theory of mathematics significantly more than male classmates.

Attitude toward mathematics is not a unidimensional trait. Several researchers have explored more specific aspects of attitude. Among these are confidence in learning mathematics, anxiety regarding mathematics, usefulness of mathematics, perception of mathematics as a male domain, attitude toward success in mathematics, effectance motivation, and students' perceptions of their mathematics teachers' and parents' attitudes toward them.

Confidence in learning mathematics is concerned with one's ability in mathematics; how sure a person is of being able to do mathematics. Persons with strong confidence in their ability to learn mathematics are more likely to take more mathematics courses, enjoy learning mathematics to a greater degree, be more persistent in studying mathematics, and achieve better scores on mathematics
tests than persons whose confidence in learning mathematics is low. Based on the studies of Crosswhite, Fennema and Sherman, Dowling, and Armstrong, Reyes said that correlation between confidence in learning mathematics and mathematics achievement is positive. It varied from 0.2 to 0.5 (1984, pp. 560-561).

Sherman (1980) found that of all the affective factors, confidence in learning mathematics is the strongest predictor of continued study of mathematics for both males and females. Unfortunately, females have been found to be less confident about their ability to learn mathematics than males, and underestimate their ability to solve mathematical problems (Fennema and Sherman, 1978). Wolleat, Pedro, Becker, and Fennema (1980) found that females were less confident in their ability to learn mathematics and less persistent in their study of mathematics. Isaacson (1982) found similar results in England and Wales. Commenting on the studies of Sturgeon and Russell, she found a tendency among more able females to underestimate their own mathematics ability. For example, more fifth form males predicted success on forthcoming O-level examinations than were expected to pass by their teachers, but fewer females predicted success on the same examination than were expected by their teachers.

Mathematics anxiety has to do with feelings of anxiety, dread, nervousness or associated bodily symptoms related to doing mathematics (Fennema and Sherman, 1976a). Fennema and Meyer said, "High confidence in mathematics appears to be located at one end of
a continuum and anxiety toward learning mathematics at the other end." (1985, p. 8). Fennema and Sherman found a very strong correlation (.89) between anxiety and confidence scores (1976a).

Researchers conclude that the correlation between mathematics anxiety and mathematics achievement is negative. The higher the degree of anxiety, the less the achievement (Aiken, 1970; Crosswhite, 1972; Begle, 1979; Suydam and Weaver, 1981). Mathematics anxiety appears to be an important correlate of mathematics achievement (Brassell et al., 1980) and has been shown to be more highly correlated with mathematics than any other attitudinal variables (Fennema and Sherman, 1978). There are sex-related differences in anxiety dimensions--females have higher anxiety levels (Fennema, 1978; Betz, 1978).

Mathematics usefulness concerns the students' beliefs about the usefulness of mathematics to them at the present time and in relation to their future education, vocation, or other activities (Fennema and Sherman, 1976a). Positive attitudes toward mathematics usefulness is an important factor in electing more mathematics courses or science and mathematics streaming, and in greater persistence in learning mathematics. It is likely that a person who perceives mathematics as a useful subject for his/her further study or future career would take more mathematics courses and be more persistent in learning them than a person who perceives mathematics as less useful. Furthermore, it seems that changing one's
perception of the usefulness of mathematics is the easier than changing the other attitudinal factors.

Several researchers have found important relations between the perceived usefulness of mathematics and achievement which courses are taken. High school students whose scores in mathematics achievement tests were higher perceived mathematics as more useful than those students whose scores were lower (Fennema and Sherman, 1977, 1978; Armstrong, 1980). Sherman and Fennema (1977) found high school students who perceived mathematics as useful tended to choose more mathematics courses. Armstrong and Price (1982) found that perceived usefulness of mathematics is an important factor in electing more mathematics courses. They found that male and female high school students ranked usefulness as the first important reason for taking mathematics. Based on Perl's 1979 study, Reyes (1984) said, "She identified perceived usefulness as the most important attitudinal factor in explaining differences in mathematics course election between boys and girls." (p. 572). Unfortunately, females perceived of mathematics as less useful than did males; some researchers like Fennema and Sherman have found that females believe that mathematics will be less useful personally (1978).

In Australia, Shelly found that females disliked and avoided mathematics because they could not relate it to life. Males tended to choose subjects that would be related to future careers, while females choices were more influenced by other factors, such as interest in or liking for a subject (1982). In England and Wales,
Isaacson said that 50% of the interviewed males and only 25% of the interviewed females, from among about 1250 third year secondary school students, said that mathematics would be useful for them in their future jobs (1982). In Israel, Lewy reported that males have a more positive attitude to the importance of mathematics than females at all grade levels (1982).

Mathematics is a deductive system which features abstraction, generalization, and abstract models. Due to such characteristics, mathematics has been regarded as a male domain; it seems to be unfeminine.

Researchers such as Sherman (1976) and Fennema (1977) have found that both sexes tended to see mathematics as a male domain. Consequently, females are more likely to avoid mathematics because it might hinder their social relationships with males (Fennema and Sherman, 1977; Sherman and Fennema, 1977). However, mathematics as a male domain or as a stereotyping subject was not significantly correlated with mathematical coursework (Armstrong, 1985). It was not important to the prediction of course plans (Brush, 1985) and it had little predictive value for females' enrollment or achievement (Chipman and Wilson, 1985). Further, Chipman and Wilson said, "Overall, the stereotyping of mathematics as a male domain does not seem to show much promise as a variable predictive of either enrollment decisions or achievement." (ibid, p. 304). The inconsistencies may be due to stereotypes of women's domains have changed throughout society; more females have been entering male
dominated fields such as truck driver, political leader, and astronaut.

Attitude toward success in mathematics is the tendency to avoid success in mathematics; discomfort about being successful in mathematics. Fennema and Sherman (1976a) said, "Horner (1972) suggested that women with good intellectual capacity had a fear of success (or motive to avoid success) in intellectual areas traditionally assumed to be male." (p. 2). Sherman (1976) found that high school females in higher socio-economic brackets had less positive attitudes toward success in mathematics than had males in the same socio-economic bracket. The situation was the opposite in lower socio-economic brackets. High school females had more positive attitudes toward success in mathematics than had males.

Effectance motivation in mathematics concerns a person's persistence, enjoyment, and interest in learning mathematics. Whether a person does or does not perceive mathematics as a challenging subject. Fennema and Sherman (1976a) said, "Effectance motivation is similar to problem solving attitude, an attitude not believed to be associated as highly with women as with men (Kagan, 1964)." (p. 5) It often has been said that females do not enjoy learning mathematics, are not interested in learning mathematics, and do not pursue mathematics careers. However, Sherman found that this belief is not true. She said further, "No evidence at all was found to support this view. In fact, in some instances, girls
reported significantly greater effectance motivation than boys." (1976, p. 3).

Students' perceptions of their mathematics teachers' and parents' attitudes about them as learners of mathematics have been hypothesized as other factors that could influence students' attitudes toward mathematics. Sherman found that female students in high school, as learners of mathematics, perceived their teachers as less positive toward them than toward the males. In another study, also at the high school level, she found that one third of the female students said that in learning mathematics, they were discouraged to the greatest degree by their teachers, while only one tenth of the males gave this answer (ibid, p. 4). Fennema and Sherman (1978) said that differential attitudinal influences toward females were joined by a host of other attitudinal influences such as females' perceptions of less favorable attitudes by the teachers.

Concerning students' perceptions of their parents' attitudes about them as learners of mathematics, Sherman (1976) found that both females and males have the same perceptions. Their fathers were more encouraging than their mothers with regards to learning mathematics. But, in the study of mathematics, parents were more encouraging to their sons than to their daughters. Differential attitudinal influences toward females were joined also by females' perceptions of less favorable attitudes by their parents, especially their fathers.
In summary, research results on affective variables that could influence students' performance and participation in mathematical activities are as follows: First, in almost all of the countries reported in this study, females' attitudes toward mathematics were less positive than males' attitudes. Second, there were some aspects of the affective variables that likely had the second strongest influence (after the cognitive variables) on mathematical activities—confidence in learning mathematics, anxiety for mathematics, and perceived usefulness of mathematics. The next important aspects were students' perceptions of their mathematics teachers' and parents' attitudes toward them as learners of mathematics.

Social Environment Variables

There are several important environmental factors that will determine students' attitudes toward mathematics, such as teachers, parents, classmates and other children, school organization, curricular differences, and sexism in textbooks and society.

Teachers have an important role in determining students' attitudes toward mathematics. The role would be determined by several aspects of the teacher: quality, behavior (attitude and action), and teaching style. Students develop good attitudes when they have good teachers (Callahan, 1971; Phillips, 1973). Haladyna, et al. (1983) said that teacher quality seems consistently to be related to mathematics attitudes at all grade levels. Becker found that teachers behave in ways that involve young females less in
classroom interaction and give them less encouragement in mathematics. Teachers tend to treat females and males differently. The differences found generally work in a positive way for males; males receive more teacher attention, reinforcement, and affect (1981, pp. 50-51). Dessart and Suydam (1983) cited the McMahon study concluding that the more humanistic the mathematics teacher, the better the students' attitudes toward mathematics (p. 26). McConnell found that teacher behaviors which had the greatest positive influence on students' attitudes toward algebra were clarity, enthusiasm, task orientation, higher cognitive questions, and opportunity to learn algebra (ibid, pp. 26-27). Dutton (1956) said that volume or work completed and students' task orientation in learning mathematics will determine students' attitudes toward mathematics.

Parents' attitudes toward their children's learning mathematics seems to be an important factor. They could become role models for their children in learning mathematics. Dessart and Suydam said, "Research has demonstrated that interest and expectation of parents are positively related to the achievement of their children..." (1983, p. 28). Unfortunately, parents are more encouraging to their sons than their daughters with respect to mathematics (Fennema and Meyer, 1985; Sherman, 1978).

Mathematics had been considered as more of a male domain by males than by females (Sherman, 1976; Fennema and Meyer, 1985). This suggests that male classmates and other male children could be
a pressure group for females in learning mathematics. Females who
do well in mathematics could be viewed as less feminine.

School organization (coed or single-sex grouping), curricular
differences, and sexism in textbooks and society might also
influence students' attitudes toward mathematics. In England and
Wales, Isaacson found that females in female schools are more likely
to choose science and mathematics (1982). She found also that
students who study physics or technical subjects do better in
mathematics, and their work can be a predictor of success in
learning mathematics.

Sexism in textbooks has been found in Australia, Canada, and New
Zealand. Shelly (1982), in a study of textbooks in Queensland,
found that 78% of all specific references were to males, 72% of the
illustrations represented males, and about 92% of occupations
mentioned featured males. In Canada, Mura (1982) found a similar
thing, mathematics textbooks contain striking examples of sexual
stereotyping favoring males. In New Zealand, Wily (1982) said that
sexism in more recent textbooks has shown some improvement. But, in
general, there is strong evidence of a bias favoring males. An
example are the generics 'he' and 'man.'

Sexism is not confined to textbooks, but in society as well, as
found by Mura in Canada. Mura said, "The conclusion is that school
texts portray a society even more heavily stereotyped than the real
one. These findings confirm in a dramatic way that there are
Indeed, powerful socio-cultural factors working against girls preparing to enter mathematics-related professions." (p. 39).

The environmental factors mentioned above are important in determining students' attitudes toward mathematics. Some of them, such as parents, teachers, and sexism in mathematics textbooks could be handled with greater ease than some others such as pressure from male classmates and sexism in society.

Causal Attribution in Learning Mathematics

Another theory that could explain females' course enrollment, performance, or attitudes to mathematics is called attribution theory, or causal attributions. In mathematics, causal attribution has to do with pupils' and teachers' perceptions of the causes of success or failure in mathematics assignments.

In Weiner's theory of causal attributions, there are four major causes of success and failure: ability (stable and internal), effort (unstable and internal), task (stable and external), and luck (unstable and external). Placed in a $2 \times 2$ matrix in a two-dimensional model (stability and locus of control), the four categories are shown in Figure 7.

Stability has to do with the causes of stability of an individual response from time to time. Mainly, there are two types of stability, stable and unstable. Locus of control is concerned with causes of success or failure. It can be an internal or an external cause.
STABILITY

<table>
<thead>
<tr>
<th></th>
<th>INTERNAL</th>
<th>EXTERNAL</th>
</tr>
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<tbody>
<tr>
<td>STABLE</td>
<td>ABILITY</td>
<td>TASK</td>
</tr>
<tr>
<td>UNSTABLE</td>
<td>EFFORT</td>
<td>LUCK</td>
</tr>
</tbody>
</table>

Figure 7. Weiner's Model on Causal Attributions
Ability is categorized as stable and internal because it is under an individual's control, and stable. For example, if one person can answer a question correctly because he or she is smart or another person cannot answer the question because he or she is stupid, the causes of the answers are ability.

Effort is placed into the unstable and internal category because it can be controlled by the individual, and it can vary from time to time. If there is a problem, a person may try to solve it or not try to solve it.

Task is stable and external since it is uncontrolled by the individual and its difficulty does not change from time to time. Luck is classified into unstable and external because a person has not control over it and it changes from one time to another.

If a person were asked to solve a mathematical problem such as the factorization for $3x^2 - 7x - 6$, the response could be one of the following:

1. The person factored the problem correctly because he or she is smart (ability) or the person did not factor the problem correctly because her or she is stupid (ability).

2. The person factored the problem correctly because he or she tried it (effort) or the person did not factor the problem correctly because her or she did not try (effort).

3. The person factored the problem correctly because the problem was easy for the person (task) or the person did not
factor the problem correctly because the problem was too hard for the person (task).

4. The person factored the problem correctly because the person knew the correct factorings (luck) or the person did not factor the problem correctly because her or she did not know the correct factoring (luck).

Wolleat, Pedro, Becker, and Fennema (1980) found the following sex-differences among causal attributions in learning mathematics: males attribute success to internal causes (ability), while females attribute success to external causes more often; and males frequently attribute failure to external causes, and females frequently attribute failure to internal causes.

The research results of causal attribution theory as applied to mathematics are important in aiding the understanding of the causes of lower performance and participation by females in mathematical activities. If the theory is true, an intervention program for the 'helpless behavior' of females should be provided.

In almost all the countries reported in this study, women's participation in mathematical activities, women's performance in mathematics, and women's attitudes toward mathematics was lower than men's. There are several research results that can explain these differences; some of them, such as genetic factors and different mathematical backgrounds, are still at issue.
CHAPTER III
METHODS AND PROCEDURES

In this chapter the place of study, description of subjects, design of the study, instrumentation, and the procedures will be described.

Place of Study

The geography and the population of Indonesia have been discussed. In order to provide the reader with a sense of the limits of generalizability, the place of study will be described.

The place of study is the City of Bandung, the capital city of West Java Province. The location of Bandung is almost in the middle of the province (Figure 8).

Bandung is a city in a tropical country, however, the temperature is not too warm for people used to a subtropical climate. It ranges from about 65°F to 85°F in the daytime. During the period of Dutch colonialism, the phrase "Parijs van Java" (Paris of Java) was well known. The nickname for Bandung was used because of the cities of Indonesia, the weather is relatively cooler, the area is always green, the flowers bloom everywhere, and the people, especially females, like to be well-dressed. Bandung is well-known also as "Kota Afro-Asia," the city of Afro-Asian; because
Figure 8. West Java Province with the Capital City of Bandung
The first conference of Asian and African countries was held in Bandung in 1955.

One of the first three Institutes of Teacher Training and Educational Sciences was founded in Bandung in 1954. It was called PTPG (Perguruan Tinggi Pendidikan Guru). The regional office of the Department of Education and Culture of West Java is in Bandung.

The area of Bandung is about 8098 ha (about 31 square miles), the population in 1985 was 1,420,612, and the population density (in 1985) was 175 per ha (about 45,490 per square mile) (Ruseffendi, 1985). The majority of the population are Sundanese and they use the Sundanese language for daily conversation. In schools, offices, etc., they speak Bahasa Indonesia.

Java consists of three provinces and two special regions: West Java, Middle Java, East Java, Jakarta, and Jogyakarta (Figure 9). West Java is one of the biggest provinces. Most of the people living in West Java are Sundanese. They number about 25 to 30 million (Soedijarto et al., 1980). For daily conversation, they use the Sundanese language. For official communication, except in grades I and II of several elementary schools, and in the villages, they use Bahasa Indonesia.

The area of West Java is about 46,300 sq km (about 17,855 square miles) (Statistical Yearbook of Indonesia 1983, 1984, p. 44). The population in 1985 was about 31,142,000 (ibid, p. 41). In 1980 the population density was 593 per sq km (about 1538 per sq mile) (ibid, p. 44) and in 1985 was 1744 per sq mile compared to Java, with 1826
Figure 9. Java with the Three Provinces and Two Special Regions
per sq mile. In 1980, 98.1% of the people were Moslems (ibid, p. 182) compared to Java with 93.5%. Data on public junior and senior high schools in West Java and Bandung are shown in Table 3.

The educational system of Indonesia is centralized. For elementary schools, secondary schools, and even for the IKIPs, the curricula for all subjects, programs, textbooks (although this is not strictly the case for the IKIPs), and school organization are the same throughout the country. Although everything is standardized, there are equity problems among which are: access to schooling and opportunity to achieve in school. These differences exist primarily between Java and surrounding areas in one group and the rest of the country in a second group. A USAID report stated, "There are, however, significant inequities in Indonesian primary schools, and in general terms, these are in two areas: Regional inequities (e.g., Java vs. East Indonesia) and rural-urban inequities." (1982, p. 9). These differences in equity may cause differences in achievement. The USAID report continued, "The regional inequities are significant with schools in Jakarta, Southern Sumatra, and West Java having the highest achievement scores, while those in Sulawesi, East Indonesia, and Kalimantan have the lowest scores." ... "Similar results..., and for all students, both primary and secondary, scores were lowest in Kalimantan, Sulawesi, and the eastern islands, and highest in Java and Bali." (ibid, pp. 9, 26).
Table 3

Public Junior and Senior High Schools in Bandung (1985) and West Java (1981/1982)

<table>
<thead>
<tr>
<th></th>
<th>Junior High</th>
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<th>Senior High</th>
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<tbody>
<tr>
<td></td>
<td>Schools</td>
<td>Students</td>
<td>Teachers</td>
<td>Schools</td>
</tr>
<tr>
<td>Bandung*</td>
<td>37</td>
<td>30,234</td>
<td>1,082</td>
<td>17</td>
</tr>
<tr>
<td>West Java</td>
<td>554</td>
<td>337,380</td>
<td>13,434</td>
<td>126</td>
</tr>
</tbody>
</table>

* except for the number of schools, data covers about 82% of the population

The students in Java and in nearby areas, such as southern Sumatra and Bali, achieve relatively higher scores than those in the rest of the country. Therefore, generalizations from this study should not be extended beyond Java and its environs.

**Description of the Subjects**

There are five different samples in this study:

1. **JHS3A**: ninth graders of junior high school (aged from 14 to 16 years). All were students in Bandung.
2. **JHS3B**: ninth graders of junior high school (aged from 14 to 16 years) who had just taken the National Assessment of Junior High School Achievement for the 1984/1985 school year. They were West Java students.
3. **SHS1**: tenth graders of senior high school (aged from 15 to 17 years). All were students in Bandung.
4. **SHS3**: graduates of senior high school (aged from 17 to 19 years) who had taken the National College Entrance Examination. The majority were from West Java, although some might have come from other areas of Indonesia.
5. **MT**: mathematics teachers from junior and senior high schools. Most were from Bandung.

The JHS3A differ from SHS1. The latter have passed at least the National Assessment of Junior High School Achievement, and in about one year (by the 1984 curriculum) they will be streamed into groups of university-bound students and junior college-bound students. The high school programs for university-bound students are: physical
sciences, biological sciences, social sciences, and knowledge of culture (including religion). Junior college-bound students enroll in programs relating more to applied studies such as industrial technology, computer utilization, agriculture and forestry, home economics and family planning, maritime programs, and services. The 1975 curriculum streamings were: mathematics and science, social sciences, and language. The 1984 curriculum, in 1985, had not fully developed. A new topic in SHS1 mathematics curriculum is flow charting (Departemen Pendidikan dan Kebudayaan, 1984).

JHS3A have been taught mathematics in junior high school with emphasis in the following areas according to the 1975 curriculum:

1. **Algebra**: an introduction to sets; rational numbers; solution sets of equations and inequations and their graphs; relations, functions, the quadratic function, and their graphs; systems of equations and inequations in one and two variables.

2. **Geometry**: three and two dimensional figures; similar shapes; loci and equations of a straight line; reflection and translation.

3. **Arithmetic**: the decimal system of money, length, area volume, and mass; fractions, ratios, proportions, and percentages; probability and statistics; number patterns and sequences. (Ruseffendi, 1982a, 1982b, 1982c, 1983b, 1984a).

JHS3B have been taught the above mathematics core and the following (1975 curriculum): quadratic equations and inequations,
an introduction to vectors, logarithms, and trigonometric functions. (Ruseffendi, 1984b).

SHS1 have been taught the same core as the JHS3B and additionally (1975 curriculum): an introduction to matrices, rotational and bilateral symmetries, statistics, and triangle formulas. (Departemen Pendidikan dan Kebudayaan, 1976).

SHS3 have been taught the SHS1 mathematics program and the following from the 1975 curriculum: irrational numbers, dilation, one and two circles, estimation of error, and three dimensions. The following mathematics content is provided for students in the mathematics and science stream (1975 curriculum):

1. **Algebra**: linear programming, systems of equations in three variables, series, composition of functions, remainder theorem, the exponential and logarithmic functions, mathematical induction and deduction, and proofs.

2. **Geometry**: composition of transformations and the associated transformations to matrices, the equations of a circle, and vectors.

3. **Arithmetic**: number bases other than ten.

4. **Trigonometry**: the functions of \( f: x \rightarrow a \cos x + b \sin x \).

5. **Calculus**: differentiation and integration.

These topics are discussed in greater detail in Appendix F.

**Design of the Survey**

The survey was administered in August and September of 1985 in the junior high schools, senior high schools, the IKIP Bandung, and
Regional Office of the Department of Education and Culture, West Java, Bandung. The JHS3A and SHS1 students were about half way through their respective programs for the year. The purpose of the survey was to collect data on students' mathematics performances, students' attitudes toward mathematics and life expectations, and mathematics teachers' attitudes toward the students.

**Mathematics Performance**

To see whether there are sex-related differences in mathematics performance, two groups of different subjects were sampled (Table 4).

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Graduate of</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>JHS3B</td>
<td>JHS</td>
<td>M 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F 100</td>
</tr>
<tr>
<td>SHS3</td>
<td>SHS</td>
<td>M 99</td>
</tr>
<tr>
<td></td>
<td></td>
<td>F 87</td>
</tr>
</tbody>
</table>

First, 200 junior high school graduates (100 males, 100 females) were selected from a population of 100,000 JHS3B in West Java who took the National Assessment of Junior High School Achievement in the 1984/1985 school year by the representative of the head of the West Java Regional Office, Department of Education and Culture. They were chosen to represent a cross-section of JHS3B in West Java. Their raw scores in mathematics achievement were recorded (Appendix G).
Second, 186 senior high school graduates (99 males, 87 females) who took the 1983 National College Entrance Examination for the College of Mathematics and Science Education - IKIP Bandung in mathematics were selected. Their scores in mathematics were recorded (Appendix H). Generalizations based on these data should be made cautiously since these data represent only high school graduates going to the IKIP, not to other universities or institutes.

Attitudes About Mathematics and Life Expectation

To reveal students' attitudes toward mathematics and their life expectations, a sample of 200 JHS3A (100 males, 100 females) and 200 SHS1 (100 males, 100 females) was chosen (Table 5). Ninth and tenth graders were chosen to identify possible effects due to levels of schooling. The period of concluding junior high school (9th grade) and beginning senior high school (10th grade) is a critical age when attitude may affect both achievement and career choice.

Table 5
The Sample for Measuring Students' Attitudes Toward Mathematics and Life Expectation

<table>
<thead>
<tr>
<th>Subject</th>
<th>Grade</th>
<th>Gender</th>
<th>School/Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>JHS3A</td>
<td>9</td>
<td>100</td>
<td>A/II+B/I</td>
</tr>
<tr>
<td>SHS1</td>
<td>10</td>
<td>100</td>
<td>C/II+D/I</td>
</tr>
</tbody>
</table>
The population consisted of about 60,000 students from all public junior and senior high schools in Bandung. The sample was picked in two stages: by school and by class.

1. A representative of the head of the West Java Regional Office picked two junior high schools, A from area II, and B from area I; and two senior high schools, C from area II and D from area I. The choice was based on area, school, students' achievement, and parents. According to him (the representative) the characteristics of area, school, student achievement, and parents are:
   a. Area I is a nicer place to live and to study than area II.
   b. Schools B and D traditionally are more well known than schools A and C.
   c. Most of the students in schools B and D are relatively higher achievers.
   d. The majority of parents of students in schools B and D are well-to-do; schools A and C are the opposite.

Hopefully, the schools that were sampled from different areas, schools' popularity, students' performance, and parents would be a representative sample for Bandung.

2. The students that represent each school were chosen by class and by the respective principal and/or mathematics teachers, using such criteria as students' performance in school
subjects and the numbers of male and female students in the school, so that they would represent the school.

Mathematics Teachers' Attitudes

To see whether mathematics teachers differentiated between male and female students in mathematical activities, all mathematics teachers of the four schools were asked to answer a set of questions consisting of two scales. In order to expand the subject pool, all secondary school mathematics teachers (inservice teachers) studying at the Department of Mathematics Education IKIP Bandung, and faculty members of the department working as part-time secondary school mathematics teachers were also asked to complete the surveys. The total number of mathematics teachers (MT) was 50.

Instrumentation

Five types of instruments were used in the study (Table 6):

1. Mathematics Achievement Test (MAT) for 9th graders who were engaged to finish junior high school.
2. College Entrance Examination in Mathematics (CEEM) for those high school graduates applying to the College of Mathematics and Science Education, IKIP Bandung.
3. The Fennema-Sherman Mathematics Attitude Scales (FSMAS).
4. Life Expectation Scale (LES).
5. Mathematics Teachers' Attitudes Scales (MTAS).
Table 6

Instruments Related to the Subjects and Purposes

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Subject</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT</td>
<td>JHS3B</td>
<td>math performance</td>
</tr>
<tr>
<td>CEEM</td>
<td>SHS3</td>
<td>math performance</td>
</tr>
<tr>
<td>FSMAS</td>
<td>JHS3A &amp; SHS1</td>
<td>students' attitudes toward math</td>
</tr>
<tr>
<td>LES</td>
<td>JHS3A &amp; SHS1</td>
<td>students' life expectation</td>
</tr>
<tr>
<td>MTASM &amp; MTASF</td>
<td>MT</td>
<td>teachers' attitudes</td>
</tr>
</tbody>
</table>

The Mathematics Achievement Test (MAT) is used to examine students' achievement in mathematics after completing the three-year junior high school mathematics curriculum. It is a nationwide test constructed by the government. It is intended to cover all mathematical topics in the National Curriculum for Junior High Schools. For security reasons, the test is not included. An example of a local Mathematics Achievement Test that is equivalent to the nationwide test is provided in Appendix A.

The College Entrance Examination in Mathematics (CEEM) is a nationwide test. It has been used to select students applying to the mathematics program of the Colleges of Mathematics and Science Educations, IKIPs. It is constructed by the government and is not available for security reasons. The test covered all topics in
mathematics contained in the National Curriculum for Senior High Schools.

The Fennema-Sherman Mathematics Attitude Scales (FSMAS) consist of nine scales: the confidence in learning mathematics scale (C), the mathematics anxiety scale (A), the mathematics usefulness scale (U), the mathematics as a male domain scale (MD), the attitude toward success in mathematics scale (AS), the effectance motivation in mathematics scale (E), the teacher scale (T), the father scale (F), and the mother scale (M). Each scale contains 12 items, half worded positively and half negatively, with five response alternatives: strongly agree, agree, undecided, disagree, and strongly disagree. Each responses is given a score from 1 to 5, and on each scale, except MD, the weight of 5 is given for the response that would have a positive effect on learning mathematics. The sum of the students' scores for each scale is their cumulative total. The higher the score, the more positive their attitude. For the MD scale, the less students stereotype mathematics, the higher their scores (Appendices B and D).

The authors stated, "To establish content validity, each scale dimension was defined; each author independently wrote items representing the dimension and judged the validity of the other authors' items. Items which were agreed upon as measuring an aspect of the dimension were selected with attention being given to covering the range of the dimension." (Fennema and Sherman, 1976a, pp. 5-6). The authors indicated that if the scales are used in sets of two or more, items are randomly shuffled into one instrument.
All the items were translated into Bahasa Indonesia. The administrative procedures of Fennema-Sherman were followed with two exceptions. First, all items were used as an instrument, but they were not distributed. This was to save time. In the pilot study, random distribution of items into one instrument was used. The instrument in the pilot study consisted of 18 items, two items from each scale. The students needed at least 30 minutes to finish it. Thus, to answer the 120-item instrument, including the life expectation scale, more than three hours were needed. In this study, the students had an hour and a half to complete the instrument, and the instrument with unshuffled items was answered more rapidly.

Second, the Fennema-Sherman instrument asked the students to blacked circles A, B, C, D, and E for strongly agree, agree, undecided, disagree, and strongly disagree respectively on a general-purpose NCS answer sheet. In this study they had to circle numerals 1, 2, 3, 4, and 5 respectively on an ordinary form. In analysing the data, 1 recoded into 5, 2 into 4, 3 into 3, 4 into 2, and 5 into 1 for the positively worded items.

The split-half (for the origin) and alpha (for the translation) reliabilities of the instruments are shown in Table 7. Although almost all of the reliability coefficients are smaller than the original ones, the range from .62 to .88 indicates a reasonable consistency of the students' responses to each scale. Brush said, "Most reliabilities were between .7 and .9, indicating a great deal
Table 7

The Reliability Coefficients of the Instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Reliability</th>
<th>C</th>
<th>A</th>
<th>U</th>
<th>MD</th>
<th>AS</th>
<th>E</th>
<th>Y</th>
<th>F</th>
<th>M</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin</td>
<td>Split-Half</td>
<td>.93</td>
<td>.89</td>
<td>.88</td>
<td>.87</td>
<td>.87</td>
<td>.86</td>
<td>.88</td>
<td>.91</td>
<td>.86</td>
<td></td>
</tr>
<tr>
<td>Translation</td>
<td>Alpha</td>
<td>.87</td>
<td>.88</td>
<td>.87</td>
<td>.75</td>
<td>.69</td>
<td>.87</td>
<td>.84</td>
<td>.86</td>
<td>.83</td>
<td>.62</td>
</tr>
</tbody>
</table>
of consistency in student responses." (1985, p. 129). Becker said, "Reliabilities coefficients on ... ranged from 0.64 to 0.90, which indicates a reasonable consistency in students' responses..." (1986, p. 50).

The Life Expectation Scale (LES) was constructed by the investigator. It contains 12 items, three worded positively, and nine negatively in a Likert Scale format with five response alternatives: strongly agree, agree, undecided, disagree, and strongly disagree. Each response was given a score from 1 to 5 and the weight of 5 is given for the response that would have a positive effect on learning mathematics, continuation of study, and responsibility for the students' future life. The students' total scores is their cumulative total. The higher the score, the more independent their lives (Appendices C and D).

To increase validity, before testing, the items of the scale were discussed with some high school students and some high school mathematics teachers. Their reactions guided the revision.

The Life Expectation Scale would be useful, especially if female students' attitudes toward mathematics were at least the same. If female students' attitudes toward mathematics were the same or more, females' reasons for a lessened participation in mathematical activities may be due to other factors. It was hypothesized that females and males have different life expectations; females being less positive.
The Mathematics Teachers' Attitudes Scales (MTAS) were made to measure mathematics teachers' attitudes toward female and male students studying mathematics, to determine if there are sex-related differences in their attitudes toward encouraging, believing in, and interesting their students in the learning of mathematics. There are two scales, one for measuring mathematics teachers' attitudes toward male students (MTASM) and the other for measuring attitudes' toward female students (MTASF). The scales were based on the items of the Teacher Scale of the Fennema and Sherman Mathematics Attitude Scales.

Each scale contained 12 items, half worded positively, and half negatively. The procedures of how the items were organized, how to answer the instrument, and how to score them were equivalent to the other attitude scale (Appendix E).

In the Fennema and Sherman Mathematics Attitude Scale there are several items such as: "My math teachers would encourage me to take all the math I can." It was questionable whether this kind of statement would be a valid item for the study in Indonesia, since mathematics curriculum for each grade level is mandated by the government. However, the answer would presumably be yes, since first, there are some private mathematics lessons that could be taken by JHS3A and SHS1, and second, in two years and one year, respectively, they will be streamed into several sections, of which two (1984 curriculum) will contain a great deal of mathematics. Third, in some of the secondary school mathematics textbooks, there
are several topics for personal enrichment. They are not required, but are recommended for more able students. Therefore, the validity of those items is appropriate for Indonesian students.

**Procedures**

To see whether there are sex-related differences in students' performance in mathematics, attitudes toward mathematics, life expectations, and the mathematics teachers' attitudes toward the students, a one-way ANOVA, a two-way ANOVA, a Scheffe test, and t-test were used (Table 8)

The one-way ANOVA was used to measure male and female JHS3B's performance differences in mathematics.

The two-way ANOVA was used to measure JHS3A's and SHS1's attitudes toward mathematics and life expectations. There were ten scales to be analyzed: the Confidence in Learning Mathematics Scale (C), the Mathematics Anxiety Scale (A), the Mathematics Usefulness Scale (U), the Mathematics as a Male Domain Scale (MD), the Attitude Toward Success in Mathematics Scale (AS), the Effectance Motivation in Mathematics Scale (E), the Teacher Scale (T), the Father Scale (F), the Mother Scale (M), and the Life Expectation Scale (L). The model is a 2x2 two-way ANOVA, where the number of grades and sex are 2, respectively. The schools (the number of schools is 4) were not included in the model; thus, the model was for a 2x2x4 three-way ANOVA, since the schools are not nested in grades.

The see whether sex-related differences in attitudes toward mathematics and life expectations among schools (A, B, C, and D)
<table>
<thead>
<tr>
<th>Statistical Methods/Tests</th>
<th>Subjects</th>
<th>Number</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-Way ANOVA</td>
<td>JHS3B</td>
<td>100 100</td>
<td>Math performance difference by sex</td>
</tr>
<tr>
<td>T-Test</td>
<td>SHS3</td>
<td>99 87</td>
<td>Attitude toward math and life expectation differences by sex, grade</td>
</tr>
<tr>
<td>Scheffe Test</td>
<td>School A (JHS3A)</td>
<td>50 49</td>
<td>Attitude toward math and life expectation differences by sex, grade</td>
</tr>
<tr>
<td></td>
<td>School B (JHS3A)</td>
<td>50 51</td>
<td></td>
</tr>
<tr>
<td></td>
<td>School C (SHS1)</td>
<td>54 56</td>
<td></td>
</tr>
<tr>
<td></td>
<td>School D (SHS1)</td>
<td>46 44</td>
<td></td>
</tr>
<tr>
<td>T-Test (pairwise)</td>
<td>MT</td>
<td>50</td>
<td>Attitude toward sex differences by teacher</td>
</tr>
</tbody>
</table>
exist, the Scheffe test was used. A t-test was used to compare male and female SHS3's performance in mathematics. Another t-test, pairwise, was used to analyze sex-related differences in mathematics teachers' attitudes toward their students.
CHAPTER IV
THE STUDY

This study will reveal sex-differences in students' performance in mathematics, students' attitudes toward mathematics, students' life expectations, and mathematics teachers' attitudes toward the students. The study was conducted in Bandung, West Java, in the months of August and September, 1985. The population consists of all junior high school students, senior high school students, and mathematics teachers in West Java.

Students' Performance in Mathematics

There are two samples for this study, 200 JHS3B students (100 males, 100 females) and 186 SHS3 students (99 males, 87 females).

JHS3B Students' Performance

The MAT test was used to gather data on students' performance in mathematics. The 1-10 grading system was used. Data are shown in Table 9.

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER</th>
<th>MEAN</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>100</td>
<td>6.19</td>
<td>0.79</td>
</tr>
<tr>
<td>Female</td>
<td>100</td>
<td>6.25</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Note: maximum score = 10
To see if the means are significantly different, a one-way ANOVA was used. The ANOVA computations is displayed in Table 10.

**TABLE 10**

ANOVA for JHS3B Students' Performance in Mathematics

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>1</td>
<td>0.18</td>
<td>0.32</td>
</tr>
<tr>
<td>Within Groups</td>
<td>198</td>
<td>0.57</td>
<td></td>
</tr>
</tbody>
</table>

\[ p < .25, .75^F 1,198 \approx 1.33 \]

The conclusion can be drawn that female junior high school students' performances in mathematics is higher than males, however, the difference is not significant for \( p \leq 0.05 \). Therefore, the hypothesis that female and male students' performance in mathematics are the same for the junior high school level is not rejected.

**SHS3 Students' Performance**

To gather data on students' performance in mathematics, the CEEM test was used. The maximum score is 50. Data are displayed in Table 11.

**TABLE 11**

SHS3 Students' Performance in Mathematics

<table>
<thead>
<tr>
<th>GROUP</th>
<th>NUMBER</th>
<th>MEAN</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>99</td>
<td>30.61</td>
<td>5.30</td>
</tr>
<tr>
<td>Female</td>
<td>87</td>
<td>28.49</td>
<td>5.64</td>
</tr>
</tbody>
</table>

*Note: maximum score = 50*
A t-test was used to see if the means were statistically different. A 2-tail probability of 0.541 and a 2-tail probability in pooled variance estimate of 0.009 resulted. This reveals that the means are statistically different at $p < 0.05$. The t-test will hold if the two distributions are normal and (exhibit) homoscedasticity. The homoscedasticity of the distributions have been demonstrated by the 2-tail probability value which is greater than 0.05. A Kolmogorov-Smirnov test was used to test the normality of the distributions. The results are shown in Table 12.

Table 12

The Normality Test for Data in Table 11

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean</th>
<th>S.D.</th>
<th>K-S Z</th>
<th>2-Tailed P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>99</td>
<td>30.61</td>
<td>5.30</td>
<td>0.660</td>
<td>0.777</td>
</tr>
<tr>
<td>Female</td>
<td>87</td>
<td>28.49</td>
<td>5.64</td>
<td>0.717</td>
<td>0.682</td>
</tr>
<tr>
<td>Combined</td>
<td>186</td>
<td>29.62</td>
<td>5.55</td>
<td>0.756</td>
<td>0.617</td>
</tr>
</tbody>
</table>

The individual and combined distributions are normal for $p < 0.05$ respectively.

Because the first and second distribution have homogeneous variances, all distributions are normal, and the means between the first and second groups are statistically different, the hypothesis that female and male students' performances in mathematics are the same for senior high school graduates was rejected.
Attitudes Toward Mathematics and Life Expectations

The sample for this study is 200 JHS3A students (100 males, 100 females) and 200 SHS1 students (100 males, 100 females). The instruments used were FSMAS for attitudes and LES for life expectations which measured: confidence in learning mathematics (C), mathematics anxiety (A), mathematics usefulness (U), mathematics as a male domain (MD), attitudes toward success in mathematics (AS), effectance motivation in mathematics (E), perceptions of mathematics teachers' attitude (T), perceptions of father's attitude (F), perceptions of mother's attitude (M), and life expectation (L). The lowest and highest scores are 1 and 5 respectively. Data recorded from students' responses are displayed in Tables 13 and 14. Data from Table 13 is presented in a diagram in Figure 10.

Students' attitudes toward mathematics are higher in usefulness, mathematics as a male domain, and life expectations; and lower in confidence, anxiety, attitude toward success, and expectance motivation. With regards to perceptions of others' attitudes, the lowest perception score is for teachers, and the highest for fathers. Data from Table 14 is displayed as graphs in Figures 11, 12, and 13.

Figure 11 shows that female students' attitudes are higher in mathematics as a male domain, attitude to success, and life expectations. Figure 12 shows that tenth grade students' attitudes are higher in anxiety and attitude towards success only. Figure 13
Table 13
JHS3A and SHS1 Students' Responses in Attitude and Life Expectation

<table>
<thead>
<tr>
<th>Scale</th>
<th>C</th>
<th>A</th>
<th>U</th>
<th>MD</th>
<th>AS</th>
<th>E</th>
<th>T</th>
<th>F</th>
<th>M</th>
<th>L</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.59</td>
<td>3.43</td>
<td>4.30</td>
<td>4.10</td>
<td>3.58</td>
<td>3.67</td>
<td>3.67</td>
<td>3.94</td>
<td>3.79</td>
<td>3.98</td>
<td>3.81</td>
</tr>
</tbody>
</table>

Note: the lowest and highest scores are 1 and 5 respectively

Figure 10. JHS3A and SHS1 Students' Responses in Attitudes and Life Expectation
Table 14

JHS3A and SHS1 Students' Responses in Attitudes and Life Expectation by Sex, by Grade, and by Sex and Grade

<table>
<thead>
<tr>
<th>Scale</th>
<th>Sex</th>
<th>Grade</th>
<th>Sex and Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>9</td>
</tr>
<tr>
<td>C</td>
<td>200</td>
<td>3.72</td>
<td>3.46</td>
</tr>
<tr>
<td>A</td>
<td>200</td>
<td>3.50</td>
<td>3.36</td>
</tr>
<tr>
<td>U</td>
<td>200</td>
<td>4.36</td>
<td>4.25</td>
</tr>
<tr>
<td>MD</td>
<td>200</td>
<td>3.93</td>
<td>4.27</td>
</tr>
<tr>
<td>AS</td>
<td>200</td>
<td>3.52</td>
<td>3.63</td>
</tr>
<tr>
<td>E</td>
<td>200</td>
<td>3.73</td>
<td>3.60</td>
</tr>
<tr>
<td>T</td>
<td>200</td>
<td>3.69</td>
<td>3.65</td>
</tr>
<tr>
<td>F</td>
<td>200</td>
<td>3.96</td>
<td>3.91</td>
</tr>
<tr>
<td>M</td>
<td>200</td>
<td>3.82</td>
<td>3.75</td>
</tr>
<tr>
<td>L</td>
<td>200</td>
<td>3.83</td>
<td>4.14</td>
</tr>
</tbody>
</table>

Total Mean 3.81 3.60 3.84 3.77 3.83 3.84 3.78 3.76

Note: The meanings of letters C, A, U, etc. are on page 93; the minimum score is 1, the maximum score is 5
Figure 11. JHS3A and SHS1 Students' Responses in Attitudes and Life Expectation by Sex

Figure 12. JHS3A and SHS1 Students' Responses in Attitudes and Life Expectation by Grade
Figure 13. JHS3A and SHS1 Students' Responses in Attitudes and Life Expectation by Sex and Grade
shows that female tenth grade students have the highest number of low scores on the attitude and life expectations scales.

In order to see if the mean differences between sexes and grades are significant, a two-way ANOVA (sex by grade) for each scale was computed. The results are displayed in Tables 15 through 24 and Figures 14 through 23.

From Table 15 and Figure 14, we may conclude that male and female students' attitudes toward mathematics in confidence in learning mathematics are significantly different, favoring male students. Therefore, the hypothesis that female students' attitudes toward mathematics are less positive for this scale was not rejected.

Ninth graders' confidence in learning mathematics is higher than tenth graders, but the difference is not significant. While female students are less confident than males, the difference between the sexes in ninth and tenth grade is almost the same. The interaction between sex and grade is not significant.

Table 16 and Figure 15 show that female student's anxiety is higher than male students' and that the difference is significant. Thus, the hypothesis that female students' attitudes toward mathematics for the anxiety scale are less positive was not rejected.

Ninth grade students have more anxiety about learning mathematics than tenth graders, but the difference is not significant. While female students have more anxiety about learning mathematics than male students, the difference between the two sexes is greater in tenth grade than in the ninth.
### Table 15
ANOVA for Confidence in Learning Mathematics Scale

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>6.74</td>
<td>17.28*</td>
</tr>
<tr>
<td>Grade</td>
<td>1</td>
<td>0.22</td>
<td>0.57</td>
</tr>
<tr>
<td>Sex x Grade</td>
<td>1</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>Residual</td>
<td>396</td>
<td>0.39</td>
<td></td>
</tr>
</tbody>
</table>

* p < .01

---

**Figure 14. Illustration of Interaction between Sex and Grade on the Confidence in Learning Mathematics Scale**

- **CELL MEANS**
  - **F** = Female
  - **M** = Male

- **GRADE**
  - 9
  - 10
Table 16

ANOVA for Mathematics Anxiety Scale

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>1.91</td>
<td>4.21*</td>
</tr>
<tr>
<td>Grade</td>
<td>1</td>
<td>0.67</td>
<td>1.47</td>
</tr>
<tr>
<td>Sex x Grade</td>
<td>1</td>
<td>0.63</td>
<td>1.38</td>
</tr>
<tr>
<td>Residual</td>
<td>396</td>
<td>0.46</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05

Figure 15. Illustration of Interaction between Sex and Grade on the Mathematics Anxiety Scale
Table 17 and Figure 16 illustrate that male and female students' attitudes toward mathematics, using the mathematics usefulness scale, is different favoring the male students. This difference is statistically significant. Therefore, the hypothesis that female students' attitudes towards mathematics are less positive, using the mathematics usefulness scale, was not rejected.

Ninth graders' perceptions of mathematics usefulness were higher than tenth graders, and the difference was significant. The difference in perceptions between the two sexes is greater in the ninth grade.

Table 18 and Figure 17 show that on the mathematics as a male domain scale, there is a significant difference in attitudes between the sexes, with females' being higher. The hypothesis that female students' attitudes toward mathematics are less positive was rejected.

Ninth graders' perception that mathematics is a male domain is slightly higher. While females perceive of mathematics as being less of a male domain than do males, the difference between the two sexes is greater in tenth grade than in the ninth. The interaction between sex and grade is not significant.

There is a sex-related difference on the attitude toward success in mathematics scale. The difference is significant—the females' are higher. Thus, the hypothesis that female students' attitudes toward mathematics are less positive on the attitude toward success in mathematics scale was rejected.
Table 17

ANOVA for Mathematics Usefulness Scale

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>1.10</td>
<td>4.39*</td>
</tr>
<tr>
<td>Grade</td>
<td>1</td>
<td>1.63</td>
<td>6.47*</td>
</tr>
<tr>
<td>Sex x Grade</td>
<td>1</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>Residual</td>
<td>396</td>
<td>0.25</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05

Figure 16. Illustration of Interaction between Sex and Grade on the Mathematics Usefulness Scale
Table 18

ANOVA for Mathematics as a Male Domain Scale

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>11.65</td>
<td>59.13*</td>
</tr>
<tr>
<td>Grade</td>
<td>1</td>
<td>0.09</td>
<td>0.47</td>
</tr>
<tr>
<td>Sex x Grade</td>
<td>1</td>
<td>0.76</td>
<td>3.85</td>
</tr>
<tr>
<td>Residual</td>
<td>396</td>
<td>0.20</td>
<td></td>
</tr>
</tbody>
</table>

* p < .01

Figure 17. Illustration of Interaction between Sex and Grade on the Mathematics as a Male Domain Scale

F=Female
M=Male
Table 19

ANOVA for Attitude toward Success in Mathematics Scale

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>1.34</td>
<td>5.76*</td>
</tr>
<tr>
<td>Grade</td>
<td>1</td>
<td>0.15</td>
<td>0.63</td>
</tr>
<tr>
<td>Sex x Grade</td>
<td>1</td>
<td>0.19</td>
<td>0.81</td>
</tr>
<tr>
<td>Residual</td>
<td>396</td>
<td>0.23</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05

Table 19

<table>
<thead>
<tr>
<th>Grade</th>
<th>Male Mean</th>
<th>Female Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>3.40</td>
<td>5.00</td>
</tr>
<tr>
<td>10</td>
<td>3.50</td>
<td>3.70</td>
</tr>
</tbody>
</table>

Figure 18. Illustration of Interaction between Sex and Grade on the Attitude toward Success in Mathematics Scale
Tenth grade students are higher on this scale than ninth grade students. The difference is not significant. While female students' attitudes toward success are higher than male students', the difference between the two sexes is greater in grade nine than in grade ten.

Males' effectance motivation in mathematics is higher. The difference is significant. Therefore, the hypothesis that female students' attitudes toward mathematics are less positive on the effectance motivation scale was not rejected.

Ninth graders' effectance motivation is slightly higher than tenth graders'. While males' effectance motivation is higher than females', the difference between the two sexes is greater in tenth grade than in ninth.

Female students' perceptions of their mathematics teachers' attitudes toward them as learners are lower than male students'. The difference is not significant. Therefore, the hypothesis that female students' attitudes toward mathematics are less positive, for this scale, was rejected.

Ninth grade students perceive their mathematics teachers' attitudes toward them as learners higher than the tenth graders do. The difference is significant.

The conclusions drawn from the students' perceptions of their father's attitude scale is the same as for the perceptions of mathematics teachers' attitudes scale: female students' perceptions are slightly lower, ninth graders' perceptions are significantly higher than tenth graders', and the hypothesis was rejected.
Table 20

ANOVA for Effectance Motivation in Mathematics Scale

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>1.63</td>
<td>4.81*</td>
</tr>
<tr>
<td>Grade</td>
<td>1</td>
<td>0.93</td>
<td>2.76</td>
</tr>
<tr>
<td>Sex x Grade</td>
<td>1</td>
<td>0.15</td>
<td>0.45</td>
</tr>
<tr>
<td>Residual</td>
<td>396</td>
<td>0.34</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05

Figure 19. Illustration of Interaction between Sex and Grade on the Effectance Motivation in Mathematics Scale
Table 21

ANOVA for Students' Perceptions of Mathematics Teachers' Attitudes Scale

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>0.19</td>
<td>0.63</td>
</tr>
<tr>
<td>Grade</td>
<td>1</td>
<td>1.83</td>
<td>6.00*</td>
</tr>
<tr>
<td>Sex x Grade</td>
<td>1</td>
<td>0.01</td>
<td>0.84</td>
</tr>
<tr>
<td>Residual</td>
<td>396</td>
<td>0.31</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05

Figure 20. Illustration of Interaction between Sex and Grade on the Students' Perceptions of Mathematics Teachers' Attitudes Scale
Table 22
ANOVA for Students' Perceptions of their Fathers' Attitudes Scale

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>0.26</td>
<td>0.82</td>
</tr>
<tr>
<td>Grade</td>
<td>1</td>
<td>1.94</td>
<td><strong>6.13</strong>*</td>
</tr>
<tr>
<td>Sex x Grade</td>
<td>1</td>
<td>0.05</td>
<td>0.16</td>
</tr>
<tr>
<td>Residual</td>
<td>396</td>
<td>0.32</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05

Figure 21. Illustration of Interaction between Sex and Grade on the Students' Perceptions of their Father's Attitudes Scale

F=Female  
M=Male
The conclusions drawn from the students' perceptions of their mother's attitudes scale is the same as for the perceptions of father's attitudes scale: female students' perceptions are slightly lower, ninth graders' perceptions are significantly higher than tenth graders', and the hypothesis was rejected.

Female students' life expectations are significantly higher than the male students'. The hypothesis that female students' attitudes toward mathematics are less positive on the life expectations scale was rejected. Ninth grade students' life expectations are slightly higher than tenth grade students'.

A recapitulation of students' attitudes toward mathematics and life expectation is displayed in Table 25.

**Students' Attitudes Toward Mathematics and Life Expectations by School**

There are four schools involved in this study, schools A, B, C, and D. JHS3A students are from schools A and B, and SHS1 are from schools C and D. Schools B and D are relatively better schools than schools A and C. Students' responses to all affective scales by schools are displayed in Table 26. This data is presented in graph form in Figure 23.

To see if sex-related differences in attitudes toward mathematics and life expectations exist in school, Scheffe tests were used. The results were:
Table 23
ANOVA for Students' Perceptions of their Mothers' Attitudes Scale

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>0.53</td>
<td>1.82</td>
</tr>
<tr>
<td>Grade</td>
<td>1</td>
<td>3.50</td>
<td>11.96*</td>
</tr>
<tr>
<td>Sex x Grade</td>
<td>1</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>Residual</td>
<td>396</td>
<td>0.29</td>
<td></td>
</tr>
</tbody>
</table>

* p < .01

Figure 22. Illustration of Interaction between Sex and Grade on the Students' Perceptions of their Mothers' Attitudes Scale
Table 24

ANOVA for Life Expectation Scale

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>9.98</td>
<td>52.20*</td>
</tr>
<tr>
<td>Grade</td>
<td>1</td>
<td>0.11</td>
<td>0.58</td>
</tr>
<tr>
<td>Sex x Grade</td>
<td>1</td>
<td>0.04</td>
<td>0.19</td>
</tr>
<tr>
<td>Residual</td>
<td>396</td>
<td>0.19</td>
<td></td>
</tr>
</tbody>
</table>

* p < .01

Figure 23. Illustration of Interaction Between Sex and Grade on Life Expectation Scale
Table 25

Recapitulation of Students' Attitudes toward Mathematics and Life Expectation

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean Male</th>
<th>Mean Female</th>
<th>For</th>
<th>Mean Ninth</th>
<th>Mean Tenth</th>
<th>For</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>3.72</td>
<td>3.46</td>
<td>M*</td>
<td>3.61</td>
<td>3.56</td>
<td>N</td>
</tr>
<tr>
<td>A</td>
<td>3.50</td>
<td>3.36</td>
<td>M**</td>
<td>3.39</td>
<td>3.47</td>
<td>T</td>
</tr>
<tr>
<td>U</td>
<td>4.36</td>
<td>4.25</td>
<td>M**</td>
<td>4.37</td>
<td>4.24</td>
<td>N**</td>
</tr>
<tr>
<td>MD</td>
<td>3.93</td>
<td>4.27</td>
<td>F*</td>
<td>4.11</td>
<td>4.08</td>
<td>N</td>
</tr>
<tr>
<td>AS</td>
<td>3.52</td>
<td>3.63</td>
<td>F**</td>
<td>3.56</td>
<td>3.59</td>
<td>T</td>
</tr>
<tr>
<td>E</td>
<td>3.73</td>
<td>3.60</td>
<td>M**</td>
<td>3.72</td>
<td>3.62</td>
<td>N</td>
</tr>
<tr>
<td>T</td>
<td>3.69</td>
<td>3.65</td>
<td>M</td>
<td>3.74</td>
<td>3.60</td>
<td>N**</td>
</tr>
<tr>
<td>F</td>
<td>3.96</td>
<td>3.91</td>
<td>M</td>
<td>4.01</td>
<td>3.87</td>
<td>N**</td>
</tr>
<tr>
<td>M</td>
<td>3.82</td>
<td>3.75</td>
<td>M</td>
<td>3.88</td>
<td>3.69</td>
<td>N*</td>
</tr>
<tr>
<td>L</td>
<td>3.83</td>
<td>4.14</td>
<td>F*</td>
<td>4.00</td>
<td>3.97</td>
<td>N</td>
</tr>
</tbody>
</table>

* p < .01  M=Male  N=9th grade
** p < .05  F=Female  T=10th grade
Table 26

Means of Students' Attitudes Toward Mathematics and Life Expectation by School

<table>
<thead>
<tr>
<th>Scale</th>
<th>C</th>
<th>A</th>
<th>U</th>
<th>MD</th>
<th>AS</th>
<th>E</th>
<th>F</th>
<th>H</th>
<th>L</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.68</td>
<td>3.50</td>
<td>4.37</td>
<td>4.11</td>
<td>3.44</td>
<td>3.79</td>
<td>3.78</td>
<td>3.96</td>
<td>3.85</td>
<td>4.07</td>
</tr>
<tr>
<td>B</td>
<td>3.54</td>
<td>3.28</td>
<td>4.37</td>
<td>4.12</td>
<td>3.67</td>
<td>3.65</td>
<td>3.69</td>
<td>4.06</td>
<td>3.91</td>
<td>3.93</td>
</tr>
<tr>
<td>C</td>
<td>3.46</td>
<td>3.34</td>
<td>4.11</td>
<td>4.05</td>
<td>3.53</td>
<td>3.48</td>
<td>3.55</td>
<td>3.74</td>
<td>3.65</td>
<td>3.91</td>
</tr>
<tr>
<td>D</td>
<td>3.69</td>
<td>3.63</td>
<td>4.40</td>
<td>4.13</td>
<td>3.68</td>
<td>3.79</td>
<td>3.66</td>
<td>4.03</td>
<td>3.74</td>
<td>4.03</td>
</tr>
<tr>
<td>Total</td>
<td>3.59</td>
<td>3.43</td>
<td>4.30</td>
<td>4.10</td>
<td>3.58</td>
<td>3.67</td>
<td>3.94</td>
<td>3.79</td>
<td>3.98</td>
<td>3.81</td>
</tr>
</tbody>
</table>
Figure 24. Means of Students' Attitudes toward Mathematics and Life Expectation by School

- Tenth graders with higher socio-economic status, higher average achievement, and enrolled in a higher status school.
- Tenth graders with lower socio-economic status, lower average achievement, and enrolled in a lower status school.
1. **Confidence in Learning Mathematics Scale (C)**
   Mean scores in descending order by school are: D, A, B, and C. No two schools are significantly different.

2. **Mathematics Anxiety Scale (A)**
   Mean scores in descending order by school are: D, A, C, and B. School D is significantly different from schools B and C respectively.

3. **Mathematics Usefulness Scale (U)**
   Mean scores in descending order by school are: D, B, A, and C. School C is significantly different from schools A, B, and D, respectively.

4. **Mathematics as a Male Domain Scale (MD)**
   Mean scores in descending order by school are: D, B, A, and C. No two schools are significantly different.

5. **Attitude Toward Success in Mathematics Scale (AS)**
   Mean scores in descending order by school are: D, B, C, and A. School A is significantly different from schools B and D respectively.

6. **Effectance Motivation in Mathematics Scale (E)**
   Mean scores in descending order by school are: D, A, B, and C. School C is significantly different from schools A and D respectively.

7. **Perceptions of Mathematics Teachers' Attitudes Scale (T)**
   Mean scores in descending order by school are: A, B, D, and C. Schools A and C are significantly different.
8. **Perceptions of Fathers' Attitudes Scale (F)**

Mean scores in descending order by school are: B, D, A, and C. School C is significantly different from schools A, B, and D respectively.

9. **Perceptions of Mothers' Attitudes Scale (M)**

Mean scores in descending order by school are: B, A, D, and C. Schools B and C are significantly different.

10. **Life Expectation Scale (L)**

Mean scores in descending order by school are: A, D, B, and C. No two schools are significantly different.

11. **Total Mean**

Total mean scores in descending order by school are: D, A, B, and C.

The main conclusion is that tenth graders from a lower socio-economic background, who are relative low achievers, and attend a lower status school have lower scores in all scales than their counterparts.

**Mathematics Teachers' Attitudes Toward the Students**

To see if mathematics teachers differentiate between male and female students in learning mathematics, 50 mathematics teachers (MT) in junior and senior high school were asked to answer two kinds of MTASs; the MTASM for male students and the MTASF for female students. Their responses were displayed in Table 27.
A pairwise t-test was used to see if the difference was significant. The t-test results show that the difference is statistically significant at the 0.05 level (2-tail probability < 0.002), favoring male students. Therefore, the hypothesis that mathematics teachers' attitudes toward female and male students are the same was rejected. Mathematics teachers were more encouraging of male students in mathematics than of female students.
CHAPTER V
CONCLUSIONS

This last chapter summarizes the results of the previous chapters, discusses the implications, lists suggestions for further study, and makes recommendations based on the implications.

Summary of Results

The summary of results is organized with reference to the hypothesis presented in Chapter 1, and are presented by section along with additional findings.

Hypothesis 1. Female and male students' performances in mathematics are the same.

1.1 Female students' performances in mathematics at the elementary school level were slightly higher than male students'. The difference was not significant.

1.2 Female students' performances in mathematics at the junior high school levels were also slightly higher than male students'. The difference was not significant.

1.3 Female students' performances in mathematics at the senior high school level was significantly lower than male students' (p < 0.05).
The hypothesis that female and male students' performances in mathematics are the same was not rejected for the junior high school level and levels below.

Hypothesis 2. Female students' attitudes toward mathematics are less positive than male students'.

2.1 Female students were less confident of their ability to learn mathematics than were male students. The difference was statistically significant at the 0.01 level. Ninth graders' confidence in learning mathematics was slightly higher, the difference was not significant. The degree of students' feelings of confidence by schools was, in descending order, D, A, B, and C. No two schools were significantly different.

The hypothesis that female students' attitudes toward mathematics are less positive, for the confidence in learning mathematics scale was not rejected.

2.2 Female students' anxiety about learning mathematics was higher. The difference was statistically significant at the 0.05 level. Ninth graders were slightly higher than tenth graders in anxiety, but the difference was not significant. Students' levels of anxiety by schools were, in descending order, B, C, A, and D; where the differences between schools B and D, and C and D respectively were statistically significant at the 0.05 level.
The hypothesis that female students' attitudes toward mathematics are less positive, as measured by the anxiety scale was not rejected.

2.3 The overall female students' score in perceiving the usefulness of mathematics was 4.25 (5 being the maximum score); however, they perceived mathematics as being less useful than did male students. Tenth grade students perceived mathematics as less useful than did ninth grade students. In both cases, the differences were statistically significant at the 0.05 level. Students' levels of usefulness perceptions by schools, in descending order were D, B, A, and C. The differences between schools D and C, B and C, and A and C were statistically significant at the 0.05 level.

The hypothesis that female students' attitudes toward mathematics are less positive as measured by the mathematics usefulness scale was not rejected.

2.4 Female students' perceptions of mathematics as a male domain was significantly lower at the 0.01 level than male students'. While female students perceived mathematics as less of a male domain than male students did, the difference between the two sexes was greater in tenth grade than in ninth grade. Ninth graders perceived mathematics as less of a male domain than did tenth graders. The difference, however, was not significant. The degree of
students' perceptions of mathematics as a male domain by school, in descending order, was C, A, B, and D. No two schools were significantly different.

The hypothesis that female students attitudes toward mathematics are less positive, for the mathematics as a male domain scale was rejected.

2.5 Attitudes of female students toward success in mathematics was higher than that of male students. The difference was significant at the 0.05 level. Attitudes of tenth graders toward success in mathematics was slightly higher than that of ninth graders. The difference was not significant.

Students' attitudes toward success in mathematics by schools, in descending order, were D, B, C, and A. The differences were significant at the 0.05 level between schools D and A, and B and A.

The hypothesis that female students' attitudes toward mathematics are less positive, for the attitude toward success in mathematics scale, was rejected.

2.6 Female students' effectance motivation was significantly lower than that of male students' at the 0.05 level. Ninth graders' effectance motivation was slightly higher than tenth graders'. The difference was not significant.

Students' levels of effectance motivation by schools, in descending order, were D, A, B, and C. The differences
were significant at the 0.05 level between schools D and C, and A and C.

The hypothesis that female students' attitudes toward mathematics are less positive for the effectance motivation scale was not rejected.

2.7 Female students' perceptions of their mathematics teachers' attitudes about them as learners were slightly lower than those of male students. The difference was not significant. Ninth grade students' perceptions of their mathematics teachers' attitudes about them as learners were significantly higher than tenth graders' at the 0.05 level. Students' perceptions of these attitudes by schools, in descending order were A, B, D, and C. The difference was significant at the 0.05 level between schools A and C.

The hypothesis that females' students' attitudes toward mathematics are less positive, for the mathematics teachers' attitudes scale, was rejected.

2.8 Female students' perceptions of their father's attitudes about them as learners were slightly lower than those reported by male students. The difference was not significant. Nine grade students' perceptions of their father's attitudes about them as learners were significantly higher than tenth grade students' at the 0.05 level. Students' perceptions of these attitudes by school,
in descending order, were B, D, A, and C. The significant
differences were between schools B and C, D and C, and A
and C.

The hypothesis that female students attitudes toward mathematics
are less positive for the perceptions of father's attitudes scale
was rejected.

2.9 Female students' perceptions of their mother's attitudes
about them as learners were slightly lower than those
reported by male students. The difference was not
significant. Ninth grade students' perceptions of their
mother's attitudes about them as learners were higher than
tenth grade students'. The difference was significant at
the 0.01 level. The degree to which students perceived
these attitudes was different from school to school. In
descending order were B, A, D, and C. The difference was
significant at the 0.05 level between schools B and C.

The hypothesis that female students' attitudes toward
mathematics are less positive for the perceptions of mother's
attitudes scale was rejected.

Minor hypothesis 1. Mathematics teachers' attitudes toward
female and male students are the same.

Mathematics teachers offered different levels of encouragement
to female and male students. The difference was statistically
significant, in favor of male students, at the 0.05 level.
Therefore, the hypothesis that teachers' attitudes to female and male students are the same was rejected.

Minor Hypothesis 2. Female students' life expectations are less positive than male students.

Female students' life expectation scores were higher than male students'. The difference was statistically significant at the 0.01 level. Ninth grade students' life expectations were slightly higher than tenth grade students'. The difference was not significant. Students' life expectations were slightly different in schools A, B, C, and D. The life expectations, in descending order, were A, D, B, and C. No two schools were significantly different.

The hypothesis that female students' life expectations were less positive than male students' was rejected.

These findings imply that female students' life expectations compared to those of male students were not those expected by the investigator. The investigator expected females would prefer to be dependent upon males, to marry rather than attend a university, to not work hard, to avoid leadership roles, not to be involved in advanced mathematical activities, and to have male rather than female children.

In summary, in a school system where all mathematics courses are compulsory, sex-related differences in mathematics performance also exist. These differences appear to be age-related, but they do not occur until the tenth grade level. Females students' attitudes toward mathematics, as measured by the FSMAS, were positive; the
lowest and highest scores were 3.36 and 4.27 respectively. However, with regard to attitudes about learning mathematics, seven out of nine of the FSMAS scales favored male students, with the differences of four of these seven scales statistically significant.

The causes of female students' lower performance and attitudes in mathematics may be due to the mathematics teachers' different treatments of female and male students as learners of mathematics or female students' lower perceptions of their parents' attitudes in encouraging them to learn mathematics.

Ninth grade students' attitudes toward mathematics were more positive than tenth grade students'. Seven of the nine FSMAS scales favored the ninth graders, four of these measures being statistically significant. Moreover, the two scales favoring the tenth graders were not statistically different. In terms of learning mathematics, tenth grade may be the most critical grade for both sexes.

Female students' life expectations were predicted to be lower than males'. The finding was the opposite. Therefore, this measure offers no explanation for females' lower participation, lower performance, and less positive attitudes with respect to mathematics.

Tenth grade students of parents with lower socio-economic status, lower average achievement, and enrolled in a lower status school had lower scores on each of the ten affective variable scales than their counterparts.
Implications

A different background in mathematics has been considered to be an explanatory variable in understanding sex-related differences in mathematics. In West Java, Indonesia, where mathematics courses are compulsory for each grade level and in each main stream, sex-related differences in mathematics performance occurred; females' performance was significantly lower. These significant differences were not found in the sixth or ninth grades, they were, however, found in the 12th grade. This is parallel to Brush's (1985) conclusion that more required mathematics courses will produce better prepared students and implies that difference between females' and males' performances in mathematics could be narrowed by requiring all mathematics courses through the high school years. Nevertheless, this study's investigation of the causes of females' low participation in mathematical activities through students' mathematics performance was inconclusive.

Female students' perceptions of mathematics teachers' attitudes about them as learners were lower than male students'. A questionnaire was used with the teachers to test whether this option was commensurate with teachers' attitudes. The results show that the students were right. Mathematics teachers treated female and male students differently, favoring male students. This implies that the questionnaire for teachers was a useful instrument to test the validity of students' perceptions. Similar instruments, such as for father and mother, could be made.
Mathematics teachers' lower encouragement of female students to learn mathematics may aid the understanding of female students' declining attitudes toward mathematics (over all scales except male domain) between grade nine and ten. However, this finding cannot be related to their mathematics performances, because while ninth grade female students' attitudes were lower than male students', their mathematics performances were higher than their male counterparts.

Likert-type instruments, such as the Fennema and Sherman Mathematics Attitude Scales, yielded a measure of Indonesian students' attitudes toward mathematics that was similar to those in the United States. Females were less confident in learning mathematics, females perceived mathematics as less of a male domain, females perceived mathematics as less useful, females were more anxious in learning mathematics, females effectance motivation was lower, and females felt that their mathematics teachers and parents encouraged them less in learning mathematics. These instruments, the translated ones, were very useful in revealing and comparing female and male students' attitudes toward mathematics in Indonesia.

The life expectation scale was useful in revealing and comparing female and male students' life expectations, however, it was not successful in explaining female students' lower participation in mathematical activities. It had also been thought that female students' life expectations were lower. However, results revealed the opposite was the case, to a significant degree. Females' higher attitudes on this scale, and on two other scales—mathematics as a
male domain, and attitudes toward success in mathematics—may prove useful for intervention programmers and as a prerequisite condition for female students to improve their attitudes toward mathematics.

The attitudes of ninth grade students toward mathematics were higher than that of tenth grade students. This implies that the intervention program for improving students' attitudes toward mathematics should be implemented earlier than tenth grade.

Recommendations

Two kinds of recommendations are presented: recommendations for further study, and recommendations for practices.

Recommendations for Further Study

1. Students' attitudes toward mathematics scores were lower on the confidence, anxiety, attitudes toward success, and effectance motivation scales, but higher on the usefulness, mathematics as a male domain, and life expectation scales. It appears students were suppressed in learning mathematics. The causes of the lower scores should be investigated. It may be due to academic problems: the materials in the textbooks, examination questions, or daily assignments were too hard. It also may be due to teacher and/or student problems: the students needed more explanations to master the concepts in the textbooks, the teachers scored the students' work too strictly, or the students never had enjoyment in learning mathematics.

2. The investigator found that some of the items in the attitudes toward success scale were culturally biased. For
Indonesia, they need refinement to give better results. Only a small number of students recorded a 5 for items like:

a. People would think I was some kind of grind if I got A's in math.

b. I don't like people to think I'm smart in math.

c. If I got the highest grade in math I'd prefer no one knew.

Through an interview and discussion with about 5% of the students, most of them said that it is an ethical problem. They would be happy to be smart and get high scores in mathematics, but they do mind to show force, to be well known through demonstrative actions, to be smart and get high grades in mathematics through open efforts. They felt that being openly ambitious would hurt other people's feelings.

3. The Pearson correlation coefficients of confidence and anxiety, mother's and father's attitudes, and confidence and effectance motivation scales were .79, 0.76, 0.70 respectively. In Indonesia, the number of scales used could be reduced based on these correlation coefficients.

4. The alpha coefficient of the life expectation scale was not high (0.62). A refinement should be accomplished through a more reliable scale. For example, through a careful item analysis.

5. The validity of female students' perceptions of their mathematics teachers' attitudes about them as learners has been strengthened by the results of the teachers' measure.
A similar study could be done for the students' parents. For the instrument, the MTAS can be used.

6. It has been found that female students' mathematics performance in ninth grade was slightly higher than males', whereas for High School graduates, it was significantly lower. It would be useful to see where the change began, in grades ten, eleven or twelve. The new information would be beneficial for intervention programs.

7. Sexism in textbooks has been found in the United States, Australia, Canada, and New Zealand. It has been thought that sexism in textbooks influences students' attitudes toward mathematics. Therefore, sexism in textbooks could be another variable to consider for further study in revealing students' attitudes toward mathematics.

Recommendations for Practice

Recommended interventions for Indonesia will be described based on the study results and related to what has been happening in several countries. Several advantages accrue to females who participate in intervention programs. First, their attitudes toward success in learning mathematics, perceptions of mathematics as less a male domain, and life expectations are higher than male students'. Second, women of Indonesia, by law, have the same political rights and status as men. During the past two decades, the Indonesian government has challenged and encouraged women to participate more fully in development. The recommendations are:
1. The Indonesian secondary school curriculum requires all students to enroll in all mathematics courses for their grade level and stream. It seems to be a better model for sustaining female students' performance and attitudes toward mathematics than a free-choice system. Additional activities or programs at the senior high school level that could increase female and enhance male students' attitudes and performances in mathematics should be provided.

2. Feelings of students toward mathematics are largely the result of interaction in school (programs, methods, activities), with other people (teachers, parents, classmates, class counselors, principals, mathematicians), and career choices.

In this study, female students perceived mathematics as less useful and enjoyed it less. Mathematics teachers differentiated between female and male students as learners and their students of both sexes perceived their mathematics teachers' attitudes about them as learners less favorably than did the teachers themselves. Tenth grade students perceived mathematics teachers', fathers', and mothers' attitudes about them as learners of mathematics as being less encouraging than did ninth grade students. Tenth grade students with parents of a lower socio-economic status, lower average achievement, and enrolled in a lower status school had lower scores in each of the ten affective variables scales than their counterparts. Principals, mathematics teachers, class counselors, parents, and students have an obligation to overcome these problems.
Activities that could help change students' attitudes in more positive directions are:

2.1 Giving information to female students about the usefulness of mathematics in advanced study, careers, and daily life.

2.2 Providing mathematical activities that will attract female students to mathematics.

2.3 Carrying out a more humanistic approach to mathematics instruction that emphasizes clarity, enthusiasm, task orientation, and high cognitive functioning. Such a strategy may change students' attitudes for the better (Dessart and Suydam, 1983).

2.4 Reducing the gap between students' perceptions of mathematics teachers' attitudes about them as learners in mathematics and what the teachers thought.

2.5 Treating female and male students equally. Mathematics teachers who have been differentiating between encouragement to female and male students should be made more aware of the detrimental effects this has on female students.

2.6 Increasing parents' awareness of their daughters' feelings that their parents offered less encouragement to learn mathematics. Feasible approaches could be through parents' and teachers' associations, radio, and television.


GIA (August, 1982). The world of garuda Indonesia airways.


APPENDIX A

MATHEMATICS ACHIEVEMENT TEST (MAT) FOR NINTH GRADERS
AI

IN BAHASA INDONESIA
Mathematics Achievement Test (MAT) for 9th Graders

A. In Bahasa Indonesia

TES PRESTASI BELAJAR
AKHIR SEMESTER GANJIL TAHUN AJARAN 1983 - 1984
SEKOLAH MENENGAH UMUM TINGKAT PERTAMA

BIDANG STUDI : MATEMATIKA
KELAS : III (TIGA)
HARI DAN TANGGAL : 8 - 12 - 1983
WAKTU : 10.00 - 11.30 (90 MENIT)

Petunjuk: Untuk soal nomor 1 s/d 32 berilah tanda silang (X) pada salah satu huruf di muka jawaban yang paling tepat.

1. Di antara relasi dari himpunan P ke himpunan Q di bawah ini yang merupakan pemetaan adalah:

   P   Q
   A   B   C   D

2. Jika \( f : x \mapsto 2x - 3 \) dan \( f(a) = 5 \), maka nilai \( a \) sama dengan:
   A. -13
   B. 4
   C. 7
   D. 1

3. Di antara barisan-barisan di bawah ini yang merupakan barisan Fibonacci adalah:
   A. 1, 3, 4, 7, 11, 18
   B. 1, 3, 6, 10, 15, 21
   C. 1, 3, 5, 7, 11, 13
   D. 1, 3, 7, 13, 21, 30

4. Pada pemetaan di samping \( \{1, 9, 16\} \) merupakan:
   A. Domainsnya
   B. Ranganya
   C. Kodomainsnya
   D. Fungsinya
5. Persamaan garis $2y = 3x - 1$ mempunyai gradien:
   A. 3  B. $\frac{3}{2}$  C. 2  D. $\frac{2}{3}$

6. 1, 4, 9, 16, 20, 25
Dari barisan di atas bilangan yang harus dihilangkan agar terjadi barisan yang sederhana adalah:
   A. 20  B. 16  C. 9  D. 4

7. Persamaan sumbu simetri parabola dari $f(x) = x^2 - 2x - 3$ adalah:
   A. $x = -1$  B. $x = 1$
   C. $x = -\frac{1}{4}$  D. $x = \frac{1}{4}$

8. Menurut ketentuan gambar di samping nilai $x$ sama dengan:
   A. 6  B. 8  C. 7  D. 10

9. Volume prisma di samping:
   A. 60 cm$^3$  B. 120 cm$^3$  C. 300 cm$^3$  D. 600 cm$^3$

10. Himpunan penyelesaian dari $2(x - 3) < 5(x - 1) + 8$, $x \in \mathbb{R}$ adalah:
    A. $\{ x/x < 3, x \in \mathbb{R} \}$  C. $\{ x/x > 3, x \in \mathbb{R} \}$
    B. $\{ x/x < -3, x \in \mathbb{R} \}$  D. $\{ x/x > -3, x \in \mathbb{R} \}$

11. Gradien garis yang melalui pasangan titik $(2, -3)$ dan $(4, 5)$ adalah:
    A. 1  B. -1  C. 4  D. -4

12. Jika $x \neq 2$ dan $x \neq -5$, maka pecahan $\frac{5x - 10}{x^2 + 3x - 10}$ dapat disederhanakan menjadi:
    A. $\frac{x - 2}{x + 5}$  C. $\frac{5}{x + 5}$
    B. $\frac{x - 2}{x - 5}$  D. $\frac{5}{x - 5}$
13. Volume limas di samping:
   A. 50 cm³
   B. 75 cm³
   C. 125 cm³
   D. 150 cm³

14. Persamaan garis yang melalui titik (3,5) dan (0, -4) adalah:
   A. \( y = \frac{1}{3} x - 4 \)
   B. \( y = -\frac{1}{3} x - 4 \)
   C. \( y = 3x - 4 \)
   D. \( y = -3x - 4 \)

15. Nilai minimum dari \( f(x) = x^2 + 2x - 3 \) adalah:
   A. -3
   B. -4
   C. -1
   D. -2

16. Jika sisi miring segitiga siku-siku panjangnya \( x \) cm, panjang kedua sisi yang lainnya \( (x - 4) \) cm dan \( B \) cm, maka panjang sisi miring segitiga tersebut adalah:
   A. 10 cm
   B. 11 cm
   C. 12 cm
   D. 13 cm

17. Dalam sebuah peta daerah gunung meletus, Jarak Pos keamanan dan daerah bahaya sepanjang 4 cm. Peta tersebut mempunyai skala 1 : 50.000. Maka Jarak yang sebenarnya antara Pos keamanan dan daerah bahaya:
   A. 8 km
   B. 12.5 km
   C. 20 km
   D. 2 km

18. Suatu tangki berbentuk tabung panjangnya 3 m dan jari-jari lingkarannya 70 cm. Maka tangki tersebut dapat memuat minyak tanah sebanyak:
   A. 46200 liter
   B. 4620 liter
   C. 462 liter
   D. 46,2 liter

19. Jika suatu gedung yang panjangnya 12 m pada layar TV tampak tingginya 15 cm dan panjangnya 16 cm. Maka tinggi gedung tersebut adalah:
   A. 10 \( \frac{4}{5} \) m
   B. 24 m
   C. 10 m
   D. 21 m

20. Jika penyebut tidak sama dengan 0, maka pecahan \( \frac{x^2 - 2x}{x^2 - 4} \) dapat disederhanakan menjadi:
   A. \( \frac{x + 1}{x - 2} \)
   B. \( \frac{x - 1}{x + 2} \)
   C. \( \frac{x}{x - 2} \)
   D. \( \frac{x}{x + 2} \)
21. Menurut ke\textsuperscript{tetuan gambar di samping x =}
\begin{align*}
&A. \ 6 \frac{2}{3} \\
&B. \ 7 \\
&C. \ 8 \frac{1}{3} \\
&D. \ 9
\end{align*}

22. Kalau kita ingin membuat tabung tertutup dari karton yang tingginya 13 cm dan ja-
ri-jari alasnya 7 cm, maka luas karton yang diperlukan:
\begin{align*}
&A. \ 2002 \text{ cm}^2 \\
&B. \ 1001 \text{ cm}^2 \\
&C. \ 880 \text{ cm}^2 \\
&D. \ 440 \text{ cm}^2
\end{align*}

23. Gradien garis yang melalui pasangan titik (2,4) dan (4,8) adalah :
\begin{align*}
&A. \ 2 \\
&B. \ 6 \\
&C. \ -2 \\
&D. \ -6
\end{align*}

24. \((2x + 3)(4x - 1)\) dapat dinyatakan sebagai penjumlah suku-suku :
\begin{align*}
&A. \ 8x^2 + 14x - 3 \\
&B. \ 8x^2 + 10x - 3 \\
&C. \ 8x^2 - 14x - 3 \\
&D. \ 8x^2 - 10x - 3
\end{align*}

25. Atap suatu peneropongan bintang berbentuk \(\text{bola}\) dengan diameter lingkarannya 14m
\(\text{Jika} \ \pi = \frac{22}{7} \), maka luas atap tersebut adalah :
\begin{align*}
&A. \ 308 \text{ m}^2 \\
&B. \ 77 \text{ m}^2 \\
&C. \ 616 \text{ m}^2 \\
&D. \ 154 \text{ m}^2
\end{align*}

26. Sebuah pohon mempunyai bayangan 24 m di atas tanah horizontal sedangkan tongkat
yang tingginya 4 m pada saat yang sama mempunyai bayangan 3 m. Maka tinggi pohon
itu adalah :
\begin{align*}
&A. \ 32 \text{ m} \\
&B. \ 26 \text{ m} \\
&C. \ 18 \text{ m} \\
&D. \ 16 \text{ m}
\end{align*}

27. \(\text{Jika} \ x \neq 5 \ \text{dan} \ x \neq -1, \ \text{maka} \ \frac{2}{x - 5} + \frac{3}{x^2 - 4x - 5} \)
dapat disederhanakan menjadi :
\begin{align*}
&A. \ \frac{x + 5}{(x-5)(x+1)} \\
&B. \ \frac{2x + 5}{(x-5)(x+1)} \\
&C. \ \frac{3x + 5}{(x-5)(x+1)} \\
&D. \ \frac{5}{(x-5)(x+1)}
\end{align*}

28. Suku ke \(n \) dari barisan 4, 7, 10, 13, ..... adalah
\begin{align*}
&A. \ n + 3 \\
&B. \ 2n + 2 \\
&C. \ 3n + 1 \\
&D. \ 4n + 3
\end{align*}
29. Suku ke 6 dari barisan 2, 3, 5, 8, ... adalah
   A. 17   C. 18
   B. 15   D. 16

30. Udara yang ada dalam bola volley yang diameternya 14 cm adalah \((\pi = \frac{22}{7})\)
   A. 1436 \frac{2}{3} \text{ cm}^3
   B. 206 \frac{2}{3} \text{ cm}^3
   C. 1437 \frac{1}{3} \text{ cm}^3
   D. 207 \frac{1}{3} \text{ cm}^3

31. Persamaan garis m adalah:
   A. 2y = 3x + 4
   B. 3y - 2x = 6
   C. y = 3x + 2
   D. y - 2x = 3

32. Segitiga ABC berukuran AB = 6 cm, BC = 8 cm dan AC = 9 cm.
   Kelompok ukuran sisi-sisi yang membentuk segitiga sebangun dengan segitiga ABC:
   A. 12 cm, 16 cm, 15 cm
   B. 2 cm, 4 cm, 3 cm
   C. 27 cm, 18 cm, 24 cm
   D. 3 cm, 4 cm, 5 cm

Petunjuk: untuk soal nomor 33 s/d 36 pilihlah:
   A. Jika (1), (2) dan (3) betul
   B. Jika (1) dan (3) betul
   C. Jika hanya (4) betul
   D. Jika semua betul.

33. Persamaan garis di bawah ini yang sejajar dengan garis \(y = 2x - 3\) adalah:
   (1) 3y - 6x = 5
   (2) 4x + 2y = -6
   (3) 8x = 4y + 2
   (4) 10y - 5x = 8

34. Diameter suatu kerucut 12 cm, garis pelukisnya 10 cm.
   Jika \(\pi = 3,14\) maka:
   (1) Luas selimutnya = 188,40 cm²
   (2) Luas seluruhnya = 301,44 cm²
   (3) Tingginya = 8 cm
   (4) Volumenya = 301,44 cm³
35. Dari penjumlahan/pengurangan di bawah ini yang benar adalah:

(1) \(3x - 5y\)
\(\frac{2x}{5x} + 3y\)
\(-2x - 9y - 5x + 4y\)

(2) \(6x + 7y\)
\(-8x - 4y + 2x + 3y\)

(3) \(3x - 5y\)

(4) \(5x + 6y\)
\(3x - 2y - 2x + 4y\)

36. \(f(x) = x^2 - 4x - 5\) dengan domainnya
\(\{x/ -2 \leq x \leq 6, x \in \mathbb{R}\}\), maka

(1) nilai minimumnya adalah -9

(2) rangenya \(\{y/ -9 \leq y \leq 7, y \in \mathbb{R}\}\)

(3) Pembuat nol : -1 dan 5

(4) Persamaan sumbu simetri parabolnya \(x = 2\)

Petunjuk: untuk soal nomor 37 s/d 40 pilihlah:

A. Jika pernyataan betul, alasan betul dan keduaanya menunjukkan sebab akibat

B. Jika pernyataan betul, alasan betul tetapi keduaanya tidak menunjukkan sebab akibat

C. Jika salah satu dari kedua pernyataan itu salah

D. Jika kedua pernyataan itu semuanya salah.

37. Dalam segitiga ABC dan segitiga PQR, \(\angle ABC = 50^\circ, \angle BAC = 70^\circ, \angle RPQ = 50^\circ\)

Kedua segitiga itu sebangun.

Sebab
Dua buah segitiga adalah sebangun jika sudut-sudutnya sama besar.

38. \((x - 5)(x + 2) = (x - 4)^2 + 5(x - 5) - 1\)

Persamaan di atas disebut identitas.

Sebab

Persamaan tersebut jika variabelnya diganti oleh lambang bilangan berapa saja akan menghasilkan kalimat yang benar (ruas kiri dapat dijadikan sama dengan ruas kanan).

39. Dua buah garis masing-masing 2y - 6x = 3 dan 3x - y = 5.

Kedua garis tersebut berpotongan.

Sebab

Kedua garis tersebut gradiennya tak sama.

40. Luas permukaan \(\frac{1}{2}\) bola padat = \(2 \pi \cdot R^2\).

Sebab
Luas bola = \(4 \pi \cdot R^2\).
A2

IN ENGLISH
ACHIEVEMENT TEST

END OF ODD SEMESTER 1983 - 1984 SCHOOL YEAR

JUNIOR HIGH SCHOOL

SUBJECT : MATHEMATICS
GRADE : III (THREE)
DAY AND DATE: THURSDAY, DECEMBER 8, 1983
TIME : 10.00 - 11.30 (90 MINUTES)

Direction: To answer problems 1 to 32 cross an appropriate letter preceding the correct answer at most.

1. Among the relations from set P to set Q, the mapping one is:

A. \[ \begin{array}{c|c}
P & Q \\
\hline
P & Q \\
\end{array} \]
B. \[ \begin{array}{c|c}
P & Q \\
\hline
P & Q \\
\end{array} \]
C. \[ \begin{array}{c|c}
P & Q \\
\hline
P & Q \\
\end{array} \]
D. \[ \begin{array}{c|c}
P & Q \\
\hline
P & Q \\
\end{array} \]

2. If \( f : x \rightarrow 2x - 3 \) and \( f(a) = 5 \), then the value of \( a \) equals:
A. -13
B. 4
C. 7
D. 1

3. Among the sequences, Fibonacci sequence is:
A. 1, 3, 4, 7, 11, 18
B. 1, 3, 6, 10, 15, 21
C. 1, 3, 5, 7, 11, 13
D. 1, 3, 7, 13, 21, 30

4. At the mapping on the left, \( \{1, 9, 16\} \) is the:
A. Domain
B. Range
C. Codomain
D. Function

5. Line equation \( 2y = 3x - 1 \) has a gradient of:
A. 3
B. \( \frac{3}{2} \)
C. 2
D. \( -\frac{2}{3} \)
6. 1, 4, 8, 16, 20, 25
To have a simple sequence, the number that ought to be casted out is:

A. 20  B. 16  C. 9  D. 4

7. The axis of symmetry of parabola \( f(x) = x^2 - 2x - 3 \) is:

A. \( x = -1 \)  
B. \( x = 1 \)  
C. \( x = -1\frac{1}{2} \)  
D. \( x = 1\frac{1}{2} \)

8.
Based on the given elements, the value of \( x \) at the left figure equals:

A. 6  
B. 8  
C. 7  
D. 10

9.
The volume of prism at the left side is:

A. 60 cm\(^3\)  
B. 120 cm\(^3\)  
C. 300 cm\(^3\)  
D. 600 cm\(^3\)

10. The solution of \( 2(x - 3) < 5(x - 1) + 8 \ x \in \mathbb{R} \) is:

A. \( \{ x/x < 3, x \in \mathbb{R} \} \)  
B. \( \{ x/x < -3, x \in \mathbb{R} \} \)  
C. \( \{ x/x > 3, x \in \mathbb{R} \} \)  
D. \( \{ x/x > -3, x \in \mathbb{R} \} \)

11. The gradient of the line passing through points \((2, -3)\) and \((4, 5)\) is:

A. 1  
B. -1  
C. 4  
D. -4

12. If \( x \neq 2 \) and \( x \neq -5 \), then fraction \( \frac{5x - 10}{x^2 + 3x - 10} \) can be simplified as:

A. \( \frac{x - 2}{x + 5} \)  
B. \( \frac{x - 2}{x - 5} \)  
C. \( \frac{5}{x + 5} \)  
B. \( \frac{5}{x - 5} \)
13. The volume of pyramid at the left is:
A. 50 cm³
B. 75 cm³
C. 125 cm³
D. 150 cm³

14. Line equation passing through points (3,5) and (0,-4) is:
A. \( y = \frac{1}{3}x - 4 \)
B. \( y = -\frac{1}{3}x - 4 \)
C. \( y = 3x - 4 \)
D. \( y = -3x - 4 \)

15. The minimum value of \( f(x) = x^2 + 2x - 3 \) is:
A. -3
B. -4
C. -1
D. -2

16. If the length of the hypotenuse of a right-angle triangle is \( x \) cm, the lengths of the other two sides are \( (x - 4) \) cm and 8 cm, then the length of the hypotenuse of the triangle is:
A. 10 cm
B. 11 cm
C. 12 cm
D. 13 cm

17. In a map of an erupting volcano, the distance between a guard post and a dangerous area is 4 cm. The map's scales is 1 : 50,000. Then, the real distance between the guard post and the dangerous area is:
A. 8 km
B. 12.5 km
C. 20 km
D. 2 km

18. A cylindrical tank has 3 m in length and 70 cm of radius. Then the tank can hold kerosene for about:
A. 46,200 liter
B. 4,620 liter
C. 462 liter
D. 46,2 liter

19. If a building of 12 m in length looked in TV screen of 15 cm in height and of 18 cm in length, then the height of the building is:
A. \( 10 \frac{4}{5} \) m
B. 24 m
C. 10 m
D. 21 m
20. If the denominator is not equal to 0, then the fraction \( \frac{x^2 - 2x}{x^2 - 4} \) can be simplified in the form of:

A. \( \frac{x + 1}{x - 2} \)  
B. \( \frac{x - 1}{x + 2} \)  
C. \( \frac{x}{x - 2} \)  
D. \( \frac{x}{x + 2} \)

21. Based on the information of the picture at the left, \( x = \)

A. 6 \( \frac{2}{3} \)  
B. 7  
C. 8 \( \frac{1}{3} \)  
D. 9

22. To have a cardboard closed cylinder of 13 cm in height and with radius of 7 cm in length, the area of the cardboard we need is:

A. 2,002 cm\(^2\)  
B. 1,001 cm\(^2\)  
C. 880 cm\(^2\)  
D. 440 cm\(^2\)

23. The gradient of line passing through a pair of points (2,4) and (4,8) is:

A. 2  
B. 6  
C. -2  
D. -6

24. Expressed in an addition form, \( (2x + 3)(4x - 1) \) is equal:

A. \( 8x^2 + 14x - 3 \)  
B. \( 8x^2 + 10x - 3 \)  
C. \( 8x^2 - 14x - 3 \)  
D. \( 8x^2 - 10x - 3 \)

25. The roof of a star observatory forms a half sphere with diameter 14 m in length. If \( \pi = \frac{22}{7} \), the area of the roof is:

A. 308 m\(^2\)  
B. 77 m\(^2\)  
C. 616 m\(^2\)  
D. 154 m\(^2\)

26. A tree casts a shadow of 24 m in length on a horizontal ground while a pole of 4 m in length in the same time casted a shadow of 3 m. Then the height of the tree is:

A. 32 m  
B. 26 m  
C. 18 m  
D. 16 m

27. If \( x \neq 5 \) and \( x \neq -1 \), then \( \frac{2}{x - 5} + \frac{3}{x^2 - 4x - 5} \) can be simplified as:

A. \( \frac{x + 5}{(x - 5)(x + 1)} \)  
B. \( \frac{2x + 5}{2(x - 5)(x + 1)} \)  
C. \( \frac{3x + 5}{5} \)  
D. \( \frac{3x + 5}{(x - 5)(x + 1)} \)
28. The \( n \)th term of sequence 4, 7, 10, 13, \ldots is:

A. \( n + 3 \)  
B. \( 2n + 2 \)  
C. \( 3n + 1 \)  
D. \( 4n + 3 \)

29. The sixth term of sequence 2, 3, 5, 8, \ldots is:

A. 17  
B. 15  
C. 18  
D. 16

30. The quantity of air in a volleyball which is 14 cm in diameter (\( \pi = \frac{22}{7} \)) is:

A. 1436 cm\(^3\)  
B. 206 cm\(^3\)  
C. 1347 cm\(^3\)  
D. 207 cm\(^3\)

31. The equation of line \( m \) is:

A. \( 2y - 3x + 5 \)  
B. \( 3y - 2x = 6 \)  
C. \( y = 3x + 2 \)  
D. \( y - 2x = 3 \)

32. Triangle ABC has sides AB = 6 cm, BC = 8 cm and AC = 9 cm. A set of sides of another triangle similar to triangle ABC is:

A. 12 cm, 16 cm, 15 cm  
B. 2 cm, 4 cm, 3 cm  
C. 27 cm, 18 cm, 24 cm  
D. 3 cm, 4 cm, 5 cm

Directions: for problems 33 to 36 choose:

A. If (1), (2) and (3) are correct  
B. If (1) and (3) are correct  
C. If but (4) is correct  
D. If all are correct

33. Line equation parallel to the line \( y = 2x - 3 \) is:

(1) \( 3y - 6x = 5 \)  
(2) \( 4x + 2y = -6 \)  
(3) \( 6x = 4y + 2 \)  
(4) \( 10y - 5x = 8 \)
34. The diameter of a cone is 12 cm, the slant height is 10 cm. If \( \pi = 3.14 \) then:

(1) The lateral area \( = 188.40 \text{ cm}^2 \)

(2) The whole area \( = 301.44 \text{ cm}^2 \)

35. From the addition/subtraction the correct one/ones is/are:

(1) \( \frac{3x - 5y}{2x + 3y} + \frac{5x - 2y}{2x + 3y} \)

(3) \( \frac{3x - 5y}{2x - 9y} - \frac{3x - 2y}{2x + 4y} \)

(2) \( bx + 7y - 8x - 4y + \frac{-2x + 3y}{2x + 4y} \)

(4) \( 5x + 6y - \frac{5x}{2x + 4y} \)

36. \( f(x) = x^2 - 4x - 5 \) in the domain \( \{x/ -2 \leq x \leq 6, x \in \mathbb{R}\} \), then

(1) the minimum value is -9

(2) the range is \( \{y/ -9 \leq y \leq 7, y \in \mathbb{R}\} \)

(3) the zero of function : -1 and 5

(4) the symmetry axis of the parabola is \( x = 2 \)

Direction: for problems 37 to 40 choose:

A. If the statement is correct, the reason is correct and they are cause and effect relations

B. If the statement is correct, the reason is correct but they are not cause and effect relations

C. If one of the statements is false

D. If both statements are false

37. Of ABC and PQR triangles are given \( \angle ABC = 50^\circ \), \( \angle BAC = 70^\circ \), \( \angle RPQ = 50^\circ \) and \( \angle QRP = 60^\circ \).

The two triangles are similar.

Reason

Two triangles are similar if the corresponding angles are congruent.

38. \( (x - 5)(x + 2) = (x - 4)^2 + 5(x - 5) - 1 \)

Reason

If the variable of the equation is replaced by any numeral, the equation should be a true statement (the left side can be transformed as the right side)

39. Two lines are given, \( 2y - 6x = 3 \) and \( 3x - y = 5 \).

The two lines are intersected.
Reason
The gradients of the two lines are not the same.

40. The area of one half massive ball \(= 2\pi R^2\).

Reason
The area of the ball \(= 4\pi R^2\).
APPENDIX B

THE FENNEMA-SHERMAN MATHEMATICS ATTITUDE SCALE (FSMAS)
The Fennema and Sherman Mathematics Attitude Scale (FSMAS)

Confidence in Learning Mathematics Scale (C)

**Weight**

1. + Generally I have a secure about attempting mathematics.
2. + I am sure I could do advanced work in mathematics.
3. + I am sure that I can learn mathematics.
4. + I think I could handle more difficult mathematics.
5. + I can get good grades in mathematics.
6. + I have a lot of self-confidence when it comes to math.
7. - I'm not good in math.
8. - I don't think I could do advanced mathematics.
9. - I'm not the type to do well in math.
10. - For some reason even though I study, math seems unusually hard for me.
11. - Most subjects I can handle C.K., but I have a knack for flubbing up math.
12. - Math has been my worst subject.
Mathematics Anxiety Scale (A)

**Weight**

1. + Math doesn't scare me at all.

2. + It wouldn't bother me at all to take more math courses.

3. + I haven't usually worried about being able to solve math problems.

4. + I almost never have gotten shook up during a math test.

5. + I usually have been at ease during math tests.

6. + I usually have been at ease in math classes.

7. - Mathematics usually makes me feel uncomfortable and nervous.

8. - Mathematics makes me feel uncomfortable, restless, irritable, and impatient.

9. - I get a sinking feeling when I think of trying hard math problems.

10. - My mind goes blank and I am unable to think clearly when working mathematics.

11. - A math test would scare me.

12. - Mathematics makes me feel uneasy and confuse
Usefulness of Mathematics Scale (μ)

Weight

1. + I'll need mathematics for my future work.
2. + I study mathematics because I know how useful it is.
3. + Knowing mathematics will help me earn a living.
4. + Mathematics is a worthwhile and necessary subject.
5. + I'll need a firm mastery of mathematics for my future work.
6. + I will use mathematics in many ways as an adult.
7. - Mathematics is of no relevance to my life.
8. - Mathematics will not be important to me in my life's work.
9. - I see mathematics as a subject I will rarely use in my daily life as an adult.
10. - Taking mathematics is a waste of time.
11. - In terms of my adult life it is not important for me to do well in mathematics in high school.
12. - I expect to have little use for mathematics when I get out of school.
Mathematics as a Male Domain (X)

Weicht

1. Females are as good as males in geometry.
2. Studying mathematics is as just as appropriate for women as for men.
3. I would trust a woman just as much as I would trust a man to figure out important calculations.
4. Girls can do just as well as boys in mathematics.
5. Males are not naturally better than females in mathematics.
6. Women certainly are logical enough to do well in mathematics.
7. It's hard to believe a female could be a genius in mathematics.
8. When a woman has to solve a math problem, it is feminine to ask a man for help.
9. I would have more faith in the answer for a math problem solved by a man than a woman.
10. Girls who enjoy studying math are a bit peculiar.
11. Mathematics is for men; arithmetic is for women.
12. I would expect a woman mathematician to be a masculine type of person.
Attitude Toward Success in Mathematics Scale (AS)

**Weight**

1. + It would make me happy to be recognised as an excellent student in mathematics.
2. + I'd be proud to be the outstanding student in math.
3. + I'd be happy to get top grades in mathematics.
4. + It would be really great to win a prize in mathematics.
5. + Being first in a mathematics competition would make me pleased.
6. + Being regarded as smart in mathematics would be a great thing.
7. - Winning a prize in mathematics would make me feel unpleasantly conspicuous.
8. - People would think I was some kind of a grind if I got A's in math.
9. - If I had good grades in math, I would try to hide it.
10. - If I got the highest grade in math I'd prefer no one knew.
11. - It would make people like me less if I were a really good math student.
12. - I don't like people to think I'm smart in math.
Effectance Motivation in Mathematics (E)

**Weight**

1. + I like math puzzles.

2. + Mathematics is enjoyable and stimulating to me.

3. + When a math problem arises that I can't immediately solve, I stick with it until I have the solution.

4. + Once I start trying to work on a math puzzle I find it hard to stop.

5. + When a question is left unanswered in math class, I continue to think about it afterwars.

6. + I am challenged by math problems I can't understand immediately.

7. - Figuring out mathematical problems does not appeal to me.

8. - The challenge of math problems does not appeal to me.

9. - Math puzzles are boring.

10. - I don't understand how some people can spend so much time on math and seem to enjoy it.

11. - I would rather have someone give me the solution to a difficult math problem than to have to work it out for myself.

12. - I do as little work in math as possible.
Teacher Scale (2)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Height</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>+</td>
</tr>
<tr>
<td>2.</td>
<td>+</td>
</tr>
<tr>
<td>3.</td>
<td>+</td>
</tr>
<tr>
<td>4.</td>
<td>+</td>
</tr>
<tr>
<td>5.</td>
<td>+</td>
</tr>
<tr>
<td>6.</td>
<td>+</td>
</tr>
<tr>
<td>7.</td>
<td>-</td>
</tr>
<tr>
<td>8.</td>
<td>-</td>
</tr>
<tr>
<td>9.</td>
<td>-</td>
</tr>
<tr>
<td>10.</td>
<td>-</td>
</tr>
<tr>
<td>11.</td>
<td>-</td>
</tr>
<tr>
<td>12.</td>
<td>-</td>
</tr>
</tbody>
</table>
Father Scale (F)

**Weight**

1. + My father thinks that mathematics is one of the most important subjects I have studied.
2. + My father has strongly encouraged me to do well in mathematics.
3. + My father has always been interested in my progress in mathematics.
4. + My father thinks I'll need mathematics for what I want to do after I graduate from high school.
5. + My father thinks I'm the kind of person who could do well in mathematics.
6. + My father thinks I could be good in math.
7. - My father wouldn't encourage me to plan a career which involves math.
8. - My father hates to do math.
9. - As long as I have passed, my father hasn't cared how to have done in math.
10. - My father thinks advanced math is a waste of time for me.
11. - My father thinks I need to know just a minimum amount of math.
12. - My father has shown no interest in whether or not I take more math courses.
Moth Scale (K)

Weight

1. + My mother thinks I'm the kind of person who could do well in mathematics.
2. + My mother thinks I could be good in math.
3. + My mother has always been interested in my progress in mathematics.
4. + My mother has strongly encouraged me to do well in mathematics.
5. + My mother thinks that mathematics is one of the most important subjects I have studied.
6. + My mother thinks I'll need mathematics for what I want to do after I graduate from high school.
7. - My mother thinks advanced math is a waste of time for me.
8. - As long as I have passed, my mother hasn't cared how I have done in math.
9. - My mother wouldn't encourage me to plan a career which involves math.
10. - My mother has shown no interest in whether or not I take more math courses.
11. - My mother thinks I need to know just a minimum amount of math.
12. - My mother hates to do math.
APPENDIX C
LIFE EXPECTATION SCALE (LES)
Life Expectation Scale (LES)

**Weight**

1. - The main purpose of going to university is looking for a future spouse.
2. - After finishing high school, I prefer to marry and go to university.
3. - When a women marries, it is feminine to live dependently on the husband.
4. - In a family, financial support is husband's responsibility.
5. - Ideally, a wife should be just a house-wife.
6. - In a family, the decision maker is the husband.
7. - I prefer to have male than female children.
8. + In a family, the husband must be the head of the family.
9. - University is for males; junior college for females.
10. - I'd rather I didn't go to university if I had to be a math prospective teacher, a prospective mathematician, a prospective math educator, or a prospective math lecturer.
11. + To be successful and wealthy, I have to study and work hard.
12. + After finishing high school, I prefer to go to University, even if I had to study abroad.
APPENDIX D

ATTITUDE TOWARD MATHEMATICS AND
LIFE EXPECTATION QUESTIONNAIRE (FSMAS + LES)
APPENDIX D1
IN BAHASA INDONESIA
1. Sebelum menjawab pertanyaan pada angket terlampir ini, isilah terlebih dahulu data mengenai anda.

   Nama : ....................................................
   Jenis kelamin: wanita/pria (coret yang tidak perlu)
   Umur : ........... tahun
   Pekerjaan : ............................................
               (contoh: siswa SMP X kelas I)


3. Jawaban anda itu jangan didasarkan kepada pendapat orang lain atau pendapat masyarakat pada umumnya, akan tetapi, didasarkan kepada pendapat anda sendiri.

4. Untuk setiap pernyataan lingkarilah 1 bila anda sangat setuju (SS), 2 bila anda setuju (S), 3 bila anda tidak yakin atau tidak yakin (N), 4 bila anda tidak setuju (T), atau 5 bila anda sangat tidak setuju (ST). Tang dilingkari dari setiap pernyataan itu hanya sebuaah saja.

   Contoh 1:
   1. Bahasa adalah bidangnya wanita.
      Bila anda setuju terhadap pernyataan itu tetapi setujunya itu tidak sangat, bulatilah 2, sehingga jawaban anda itu menjadi demi-
      kian.
      1. Bahasa adalah bidangnya wanita.

   Contoh 2:
   2. Ayah saya menyukai matematika.
      2. Ayah saya menyukai matematika.

5. Terima kasih banyak atas kerjasama baiknya.

Peneliti,

(E. T. Ruseffendi)
ANGKET SIKAP DALAM MATEMATIKA
(untuk siswa)

I. KEPEMAMPUAN DIRI DALAM BELAJAR MATEMATIKA

<table>
<thead>
<tr>
<th>Nomor</th>
<th>Pernyataan</th>
<th>Skor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pada umumnya saya merasa aman belajar matematika.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2</td>
<td>Saya merasa yakin bahwa saya dapat menyelesaikan tugas yang lebih sulit dalam matematika.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3</td>
<td>Saya yakin bahwa saya dapat belajar matematika.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4</td>
<td>Saya merasa bahwa saya dapat mengatasi matematika yang lebih sulit.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5</td>
<td>Saya dapat memperoleh nilai-nilai yang baik dalam matematika.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6</td>
<td>Saya mempunyai kepercayaan diri yang cukup tinggi dalam matematika.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7</td>
<td>Dalam matematika saya selalu tidak baik.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8</td>
<td>Saya kira saya tidak dapat memahami matematika lanjutan.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9</td>
<td>Saya bukan tipenya orang yang dapat berhasil dengan baik dalam matematika.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10</td>
<td>Walau pun saya mencobanya, pada umumnya matematika itu tetap sulit bagi saya.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>11</td>
<td>Hampir semua pelajaran dapat saya atasi dengan baik kecuali matematika; saya merelukan kemampuan khusus untuk mengatasinya.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>12</td>
<td>Matematika selalu merupakan pelajaran yang terjelek bagi saya.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

II. KECEMENAN DALAM BELAJAR MATEMATIKA

<table>
<thead>
<tr>
<th>Nomor</th>
<th>Pernyataan</th>
<th>Skor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Matematika sama sekali tidak menakutkan saya.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2</td>
<td>Mengambil lebih banyak matematika, saya sama sekali tidak akan terganggu.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3</td>
<td>Mauanya saya tidak mengkhawatirkan kemampuan saya dalam menyelesaikan soal-soal matematika.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4</td>
<td>Saya hampir tidak pernah gentar menghadapi setiap tes matematika.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
1. Saya memerlukan matematika untuk pekerjaan saya di kemudian hari.
2. Saya belajar matematika karena saya mengetahui bahwa matematika itu sangat berguna.
3. Mengetahui matematika memudahkan saya mendapat pekerjaan.
4. Matematika adalah pelajaran yang berfaedah dan diperlukan.
5. Untuk pekerjaan saya di kemudian hari saya memerlukan pengetahuan matematika yang kuat.
6. Dalam kehidupan saya nanti, saya akan menggunakan matematika dalam banyak hal.
7. Matematika tidak ada hubungannya dengan kehidupan saya.
8. Untuk penghidupan saya nanti, matematika tidak penting.
10. Mengambil matematika hanya membuang-buang waktu.
11. Untuk kehidupan saya nanti, tidak penting di SMA saya menguasai matematika dengan baik.
12. Bila saya sejahtera bersekolah, saya duga matematika itu sedikit gunanya.
IV. Matematika sebagai Bidangnya Pria

1. Wanita sama baiknya seperti pria dalam matematika.
2. Untuk wanita, belajar matematika itu sama pentingnya seperti untuk pria.
3. Saya akan mempercayai wanita sama seperti mempercayai pria dalam perhitungan-perhitungan sukar.
5. Secara alamiah pria tidak lebih baik dari pada wanita dalam matematika.
6. Jelaskan cukup masuk akal, wanitapun dapat menguasai matematika.
7. Sukarn untuk dapat dipercaya bahwa wanitapun dapat istimewa dalam matematika.
8. Bila seorang wanita diminta untuk menyelesaikan soal matematika, sesuai dengan sifat wanitalah bila ia meminta bantuan kepada pria.
9. Saya lebih percaya kepada jawaban soal matematika yang diselesaikan oleh seorang pria dari pada oleh seorang wanita.
10. Anak-anak wanita yang menyukai belajar matematika adalah sedikit aneh.
11. Matematika untuk pria; berhitung untuk wanita.
12. Saya menduga, wanita yang keahliannya itu matematika adalah kelak-lakian.

V. Sikap terhadap Keberhasilan

1. Saya akan senang bila saya dipandang sebagai siswa istimewa dalam matematika.
2. Saya akan bangga bila saya menjadi siswa terpilih dalam matematika.
3. Saya akan senang bila saya memperoleh nilai-nilai tertinggi dalam matematika.
4. Sungguh hebat bila saya memperoleh hadiah dalam matematika.
5. Menjadi juara pertama dalam pertandingan matematika, bagi saya menyenangkan.
6. Hebatlah saya bila saya dipandang sebagai orang pandai dalam matematika.
7. Memperoleh hadiah dalam matematika bagi saya tidak menyenangkan.
8. Orang akan befikir saya telah bersusah payah bil-
a saya memperoleh nilai-nilai A (paling baik) dalam matematika.

9. Bila saya memperoleh nilai-nilai baik dalam ma-
tematika saya akan menyembunyikannya.

10. Bila saya memperoleh nilai tertinggi dalam mate-
matika lebih baik tidak ada orang yang mengetahui-
uinya.

11. Orang akan kurang menyukai saya bila saya sung-
guh-sungguh seorang siswa yang baik dalam mate-
matika.

12. Saya tidak menginginkan orang lain berpendapat
bawa saya pandai dalam matematika.

VI. Dorongan untuk Berhasil dalam Matematika

<table>
<thead>
<tr>
<th>No.</th>
<th>Deskripsi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Saya suka teka-teki matematika.</td>
</tr>
<tr>
<td>2</td>
<td>Matematika menyenangkan dan menarik.</td>
</tr>
</tbody>
</table>
| 3   | Bila ada soal matematika yang tidak dapat saya se-
    lesaikan langsung, saya selalu mampu menyelesai-
    kannya sampai diperoleh jawaban.                      |
| 4   | Begitu saya mulai memecahkan teka-teki matematika, 1 2 3 4 5  |
| 5   | Bila pertanyaan tentang matematika di sekolah ti-
    dak dapat saya jawab, saya lanjutkan penyele-
    sainya kemudian.                                       |
| 6   | Saya ditantang oleh soal-soal matematika yang ti-
    dak dapat saya selesaikan segera.                     |
| 7   | Memecahkan persoalan matematika bagi saya tidak men-
    arik.                                                  |
| 8   | Tantangan matematika tidak menjadi perhatian saya.                      |
| 9   | Teka-teki matematika membosankan.                                        |
| 10  | Saya tidak dapat mengerti mengapa sejumlah orang
    itu dapat menggunakan waktunya begitu banyak dalam
    matematika dan kolihatannya menyukainya.             |
| 11  | Saya lebih suka bila ada orang lain yang memberi-
    kan jawaban soal matematika yang sukar dari pada
    saya sendiri yang menyelosai kannya.                 |
| 12  | Saya melibatkan diri dalam pekerjaan matematika disedikit mungkin.     |
VII. 

GURU MATEMATIKA

1. Guru-guru saya selalu mendorong saya untuk mempelajari matematika lebih banyak. 1 2 3 4 5
2. Guru-guru saya berpendapat bahwa saya tipenya orang yang dapat berhasil baik dalam matematika. 1 2 3 4 5
3. Guru-guru matematika saya senantiasa mendorong saya sehingga saya mempunyai pendirian bahwa saya mampu mempelajari matematika lebih lanjut. 1 2 3 4 5
4. Guru-guru matematika saya akan mendorong saya untuk mengambil semua matematika yang dapat saya kuasai. 1 2 3 4 5
5. Guru-guru matematika saya selalu memperhatikan kemajuan saya dalam matematika. 1 2 3 4 5
6. Saya akan membicarakannya dengan guru matematika saya tentang pekerjaan di kemudian hari yang menggunakan matematika. 1 2 3 4 5
7. Bila saya berbicara serius kepada guru matematika, saya merasa disepelekan. 1 2 3 4 5
8. Saya selalu mendapat kesukaran untuk memperoleh pujian dari guru-guru matematika. 1 2 3 4 5
9. Guru-guru matematika saya berpendapat bahwa, bagi saya, matematika lanjutan itu hanya akan menghabiskan waktu. 1 2 3 4 5
10. Susah bagi saya untuk memperoleh guru matematika yang mau berbicara dengan saya sungguh-sungguh. 1 2 3 4 5
11. Guru-guru saya akan berpendapat saya tidak sungguh-sungguh kalau saya mengatakan kepada mereka bahwa saya berminat kepada ilmu pengetahuan alam dan matematika. 1 2 3 4 5
12. Saya senantiasa mendapat kesukaran untuk mendapatkan guru matematika yang mau berbicara tentang matematika dengan serius kepada saya. 1 2 3 4 5

VIII. 

AYAH

1. Ayah saya berpendapat bahwa matematika adalah salah satu pelajaran yang paling penting dari semua pelajaran yang telah saya pelajari. 1 2 3 4 5
2. Ayah saya selalu mendorong saya dengan keras agar saya berhasil baik dalam matematika. 1 2 3 4 5
3. Ayah saya selalu menaruh minat kepada kemajuan saya dalam matematika. 1 2 3 4 5
4. Ayah saya berpendapat bahwa saya akan memerlukan matematika untuk apa yang ingin saya lakukan setelah seleksi dari SMA. 1 2 3 4 5
5. Ayah saya berpendapat bahwa saya tipenya orang yang dapat berhasil baik dalam matematika.
6. Ayan saya berpendapat bahwa saya dapat menguasai matematika.
7. Ayah saya tidak akan mendorong saya untuk mengambil pekerjaan yang menggunakan matematika.
8. Ayah saya benci mengerjakan matematika.
9. Sepanjang saya masih lulus, ayah saya tidak peduli bagaimana penguasan saya dalam matematika.
10. Ayah saya berpendapat bahwa, bagi saya, matematika lanjutan itu hanya akan membuang-buang waktu.
11. Ayah saya berpendapat, saya cukup mengetahui matematika minimum saja.
12. Apakah saya mengambil lebih banyak matematika atau tidak, ayah saya tidak peduli.

### IX. Ibu

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ibu saya berpendapat bahwa saya tipenya orang yang dapat berhasil baik dalam matematika.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Ibu saya berpendapat bahwa saya dapat menguasai matematika.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Ibu saya selalu menaruh minat kepada kemajuan saya dalam matematika.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Ibu saya selalu mendorong saya dengan keras agar saya berhasil baik dalam matematika.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Ibu saya berpendapat bahwa matematika adalah salah satu pelajaran yang paling penting dari semua pelajaran yang telah saya pelajari.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Ibu saya berpendapat bahwa saya akan memerlukan matematika untuk apa yang ingin saya lakukan setelah selesaikan dari SMA.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Ibu saya berpendapat bahwa, bagi saya, matematika lanjutan itu hanya akan membuang-buang waktu.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>Sepanjang saya masih lulus, ibu saya tidak peduli bagaimana penguasan saya dalam matematika.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>Ibu saya tidak akan mendorong saya untuk mengambil pekerjaan yang menggunakan matematika.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>Apakah saya mengambil lebih banyak matematika atau tidak, ibu saya tidak peduli.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>Ibu saya berpendapat, saya cukup mengetahui matematika minimum saja.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>Ibu saya benci mengerjakan matematika.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Penghidupan vanz Diharapkan

1. Tujuan utama dari belajar di perguruan tinggi adalah untuk mencari calon suami/istri.

2. Setelah selesai dari SMA, saya memilih untuk berkeluarga kemudian melanjutkan ke perguruan tinggi.

3. Bagi seorang istri menyandarkan hidupnya pada suaminya itu sesuai dengan sifat wanita.

4. Dalam sebuah keluarga, keuangan itu tanggung jawab suami.

5. Secara ideal istri itu hanyalah menjadi ibu rumah tangga.

6. Dalam sebuah keluarga, pengambil keputusan itu adalah suami.

7. Saya lebih senang bila saya mempunyai anak pria dari pada anak wanita.

8. Dalam sebuah keluarga, pria harus menjadi kepala keluarga.

9. Perguruan tinggi (universitas) adalah untuk pria; akademik untuk wanita.

10. Saya lebih baik tidak melanjutkan sekolah dari pada akan menjadi guru matematika, akhlak matematika, pendidik guru matematika, atau dosen matematika.

11. Syaratnya agar kita bisa maju dan/atau kaya ialah harus belajar dan bekerja dengan keras.

12. Setelah saya selesai SMA, saya mau melanjutkan belajar ke perguruan tinggi walapun di luar negeri.
APPENDIX D2

IN ENGLISH
**DIRECTIONS**

1. First, please write down your personal data.

   **Name** : ..............................................................
   **Sex** : F or M
   **Age** : .............................................. years
   **Status** : ........................................... (e.g. first grader of JHS X)

2. Your answers would not be known by anybody else, but you and I (investigator). Your answers would be very useful for our nation. So, please, answer the questionnaire completely, seriously, and truthfully.

3. Your answers should be based on your opinion or personal experience, not on others’. The correct responses are true for you.

4. For each statement encircle 1 if you strongly agree (SA). 2 if you agree (A), 3 if you don’t know or aren’t sure (N), 4 if you disagree (D), or 5 if you strongly disagree (SD). You must have to encircle once for each statement.

   **Example 1:**
   1. Language is a female domain.
      
      If you agree but, do not strongly agree with the statement, encircle 2, so that your answer is the following.

      **Example 2:**
      2. My father likes mathematics.
      
      If you don’t know for sure that your father really likes mathematics, or because he had already passed away, encircle 3. Then your answer should be the following.

5. Thank you very much for your good cooperation.

   **Investigator,**

   *(E. T. Ruseffendi)*
### ATTITUDE AND LIFE EXPECTATION IN MATHEMATICS QUESTIONNAIRE

*(for student)*

#### I. Confidence in Learning Mathematics

<table>
<thead>
<tr>
<th></th>
<th>Statement</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Generally I have felt secure about attempting mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>I am sure I could do advanced work in mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>I am sure that I can learn mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>I think I could handle more difficult mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>I can get good grades in mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>I have a lot of self-confidence when it comes to math.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>I'm no good in mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>I don't think I could do advanced mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>I'm not the type to do well in math.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>For some reason even though I study, math seems unusually hard for me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>Most subjects I can handle O.K., but I have a knack for flubbing up math.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>Math has been my worst subject.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

#### II. Mathematics Anxiety

<table>
<thead>
<tr>
<th></th>
<th>Statement</th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Math doesn't scare me at all.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>It wouldn't bother me at all to take more math courses.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>I haven't usually worried about being able to solve math problems.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>I almost never have gotten shook up during a math test.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>I usually have been at ease during math tests.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
6. I usually have been at ease in math classes. 1 2 3 4 5
7. Mathematics usually makes me feel uncomfortable and nervous. 1 2 3 4 5
8. Mathematics makes me feel uncomfortable, restless, irritable, and impatient. 1 2 3 4 5
9. I get a sinking feeling when I think of trying hard math problems. 1 2 3 4 5
10. My mind goes blank and I am unable to think clearly when working mathematics. 1 2 3 4 5
11. A math test would scare me. 1 2 3 4 5
12. Mathematics makes me feel uneasy and confused. 1 2 3 4 5

<table>
<thead>
<tr>
<th>III. Usefulness of Mathematics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I'll need mathematics for my future work. 1 2 3 4 5</td>
</tr>
<tr>
<td>2. I study mathematics because I know how useful it is. 1 2 3 4 5</td>
</tr>
<tr>
<td>2. Knowing mathematics will help me earn a living. 1 2 3 4 5</td>
</tr>
<tr>
<td>4. Mathematics is a worthwhile and necessary subject. 1 2 3 4 5</td>
</tr>
<tr>
<td>5. I'll need a firm mastery of mathematics for my future work. 1 2 3 4 5</td>
</tr>
<tr>
<td>6. I will use mathematics in many ways as an adult. 1 2 3 4 5</td>
</tr>
<tr>
<td>7. Mathematics is of no relevance to my life. 1 2 3 4 5</td>
</tr>
<tr>
<td>8. Mathematics will not be important to me in my life's work. 1 2 3 4 5</td>
</tr>
<tr>
<td>9. I see mathematics as a subject I will rarely use in my daily life as an adult. 1 2 3 4 5</td>
</tr>
<tr>
<td>10. Taking mathematics is a waste of time. 1 2 3 4 5</td>
</tr>
<tr>
<td>11. In terms of my adult life it is not important for me to do well in mathematics in high school. 1 2 3 4 5</td>
</tr>
<tr>
<td>12. I expect to have little use for mathematics when I get out of school. 1 2 3 4 5</td>
</tr>
</tbody>
</table>
### IV. Mathematics as A Male Domain

<table>
<thead>
<tr>
<th></th>
<th><strong>SA</strong></th>
<th><strong>A</strong></th>
<th><strong>N</strong></th>
<th><strong>D</strong></th>
<th><strong>SD</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Females are as good as males in geometry.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Studying mathematics is as just as appropriate for women as for men.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. I would trust a woman just as I would trust a man to figure out important calculations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Girls can do just as well as boys in mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Males are not naturally better than females in mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. Women certainly are logical enough to do well in mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. It's hard to believe a female could be a genius in mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. Then a woman has to solve a math problem, it is feminine to ask a man for help.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. I would have more faith in the answer for a math problem solved by a man than a woman.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. Girls who enjoy studying math are a bit peculiar.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. Mathematics is for men; arithmetic is for women.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. I would expect a woman mathematician to be a masculine type of person.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
</tbody>
</table>

### V. Attitude Toward Success in Mathematics

<table>
<thead>
<tr>
<th></th>
<th><strong>SA</strong></th>
<th><strong>A</strong></th>
<th><strong>N</strong></th>
<th><strong>D</strong></th>
<th><strong>SD</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It would make me happy to be recognized as an excellent student in mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. I'd be proud to be the outstanding student in math.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. I'd be happy to get top grades in mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. It would be really great to win a prize in mathematics.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Being first in a mathematics competition would make me pleased.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
6. Being regarded as smart in mathematics would be a great thing. 1 2 3 4 5
7. Winning a prize in mathematics would make me feel unpleasantly conspicuous. 1 2 3 4 5
8. People would think I was some kind of a grind if I got As in math. 1 2 3 4 5
9. If I had good grades in math, I would try to hide it. 1 2 3 4 5
10. If I got the highest grade in math I'd prefer no one knew. 1 2 3 4 5
11. It would make people like me less if I were a really good math student. 1 2 3 4 5
12. I don't like people to think I'm smart in math. 1 2 3 4 5

VI. Effectance Motivation in Mathematics

1. I like math puzzles. 1 2 3 4 5
2. Mathematics is enjoyable and stimulating to me. 1 2 3 4 5
3. When a math problem arises that I can't immediately solve, I stick with it until I have the solution. 1 2 3 4 5
4. Once I start trying to work on a math puzzle, I find it hard to stop. 1 2 3 4 5
5. When a question is left unanswered in math class, I continue to think about it afterward. 1 2 3 4 5
6. I am challenged by math problems I can't understand immediately. 1 2 3 4 5
7. Figuring out mathematical problems does not appeal to me. 1 2 3 4 5
8. The challenge of math problems does not appeal to me. 1 2 3 4 5
9. Math puzzles are boring. 1 2 3 4 5
10. I don't understand how some people can spend so much time on math and seem to enjoy it. 1 2 3 4 5
11. I would rather have someone give me the solution to a difficult math problem than to have to work it out for myself. 1 2 3 4 5
12. I do as little work in math as possible. 1 2 3 4 5
### VII. Mathematics Teachers

<table>
<thead>
<tr>
<th></th>
<th>SA</th>
<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My teachers have encouraged me to study more mathematics.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. My teachers think I'm the kind of person who could do well in mathematics.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Math teachers have made me feel I have the ability to go on in mathematics.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. My math teachers would encourage me to take all the math I can.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. My math teachers have been interested in my progress in mathematics.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I would talk to my math teachers about a career which uses math.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. When it comes to anything serious I have felt ignored when talking to math teachers.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I have found it hard to win the respect of math teachers.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. My teachers think advanced math is a waste of time for me.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Getting a mathematics teacher to take me seriously has usually been a problem.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. My teachers would think I wasn't serious if I told them I was interested in a career in science and mathematics.</td>
<td>1 2 3 4 5</td>
<td></td>
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<tr>
<td>12. I have had a hard time getting teachers to talk seriously with me about mathematics.</td>
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### VIII. Father

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<th>A</th>
<th>N</th>
<th>D</th>
<th>SD</th>
</tr>
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<tbody>
<tr>
<td>1. My father thinks that mathematics is one of the most important subjects I have studied.</td>
<td>1 2 3 4 5</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2. My father has strongly encouraged me to do well in mathematics.</td>
<td>1 2 3 4 5</td>
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</tr>
<tr>
<td>3. My father has always been interested in my progress in mathematics.</td>
<td>1 2 3 4 5</td>
<td></td>
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</tr>
<tr>
<td>4. My father thinks I'll need mathematics for what I want to do after I graduate from high school.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. My father thinks I'm the kind of person who could do well in mathematics.</td>
<td>1 2 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. My father thinks I could be good in math.  
7. My father wouldn't encourage me to plan a career which involves math.  
8. My father hates to do math.  
9. As long as I have passed, my father hasn't cared how I have done in math.  
10. My father thinks advanced math is a waste of time for me.  
11. My father thinks I need to know just a minimum amount of math.  
12. My father has shown no interest in whether or not I take more math courses.  

**IX. Mother**

<table>
<thead>
<tr>
<th>Statement</th>
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<tbody>
<tr>
<td>1. My mother thinks I'm the kind of person who could do well in mathematics.</td>
<td>1 2 3 4 5</td>
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<tr>
<td>2. My mother thinks I could be good in math.</td>
<td>1 2 3 4 5</td>
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<tr>
<td>3. My mother has always been interested in my progress in mathematics.</td>
<td>1 2 3 4 5</td>
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<tr>
<td>4. My mother has strongly encouraged me to do well in mathematics.</td>
<td>1 2 3 4 5</td>
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<tr>
<td>5. My mother thinks that mathematics is one of the most important subjects I have studied.</td>
<td>1 2 3 4 5</td>
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<tr>
<td>6. My mother thinks I'll need mathematics for what I want to do after I graduate from high school.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. My mother thinks advanced math is a waste of time for me.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8. As long as I have passed, my mother hasn't cared how I have done in math.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. My mother wouldn't encourage me to plan a career which involves math.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10. My mother has shown no interest in whether or not I take more math courses.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>11. My mother thinks I need to know just a minimum amount of math.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>12. My mother hates to do math.</td>
<td>1 2 3 4 5</td>
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</table>
X. **Life Expectation**

<p>| | | | | |</p>
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<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1. The main purpose of going to university is looking for a future spouse.</td>
<td>1 2 3 4 5</td>
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</tr>
<tr>
<td>2. After finishing high school, I prefer to marry and go to university.</td>
<td>1 2 3 4 5</td>
<td></td>
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<tr>
<td>3. When a woman marries, it is feminine to live dependently on the husband.</td>
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<tr>
<td>4. In a family, financial support is husband's responsibility.</td>
<td>1 2 3 4 5</td>
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<tr>
<td>5. Ideally, a wife should be just a housewife.</td>
<td>1 2 3 4 5</td>
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<td></td>
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</tr>
<tr>
<td>6. In a family, the decision maker is the husband.</td>
<td>1 2 3 4 5</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7. I prefer to have male than female children.</td>
<td>1 2 3 4 5</td>
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<tr>
<td>8. In a family, a husband must be the head of the family.</td>
<td>1 2 3 4 5</td>
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</tr>
<tr>
<td>9. University is for males; junior college is for female</td>
<td>1 2 3 4 5</td>
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</tr>
<tr>
<td>10. I'd rather I didn't go to university if I had to be a math prospective teacher, a prospective mathematician, a prospective math educator, or a prospective math lecturer.</td>
<td>1 2 3 4 5</td>
<td></td>
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</tr>
<tr>
<td>11. To be successful and wealthy, I have to study and work hard.</td>
<td>1 2 3 4 5</td>
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<tr>
<td>12. After finishing high school, I prefer to go to university, even if I had to study abroad.</td>
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APPENDIX E

MATHEMATICS TEACHERS' ATTITUDES TOWARD STUDENTS QUESTIONNAIRE (MTAS)
APPENDIX E1

MTASM AND MTASF IN BAHASA INDONESIA
Mathematics Teachers' Attitude toward Students
Questionnaire (MTAS)

E1. MTASM and MTASF in Bahasa Indonesia

ANGKET SIKAP DALAM MATEMATIKA
(untuk guru)

Petunjuk Pengisian Angket:
A. Sebelum menjawab angket berikut ini, isilah terlebih dahulu da-
ta mengenai anda.

N a m a :
Jenis kelamin: wanita/pria (coret yang tidak perlu)
U m u r :
Pekerjaan:

B. Jawaban anda itu tidak akan diketahui oleh siapa pun kecuali o-
leh anda dan peneliti (saya sendiri); rahasianya terjamin. Ja-
waban anda itu akan berfaedah sekali bagi kepentingan bangsa
kita. Karena itu jawablah dengan sungguh-sungguh, lengkap, dan
sejurus-jujurnya.

C. Untuk setiap pernyataan lingkarilah 1 bila anda sangat setu-
lu (SS), 2 bila anda setulu (S), 3 bila anda tidak yakin (N), 4
bila anda tidak setulu (T); atau 5 bila anda sangat tidak setu-
lu (ST).

D. Terima kasih banyak atas kerjasama baiknya.

MTASM

1. Saya selalu mendorong siswa pria untuk belajar
   matematika lebih banyak.
   SS S N T ST
   1 2 3 4 5

2. Saya mempunyai kepercayaan bahwa siswa pria pun
dapat berhasil baik dalam matematika.
   SS S N T ST
   1 2 3 4 5

3. Saya selalu mendorong siswa pria yang bisa
   untuk belajar matematika lebih lanjut.
   SS S N T ST
   1 2 3 4 5

4. Saya selalu mendorong siswa pria untuk mengam-
bil semua matematika yang dapat mereka kuasai.
   SS S N T ST
   1 2 3 4 5

5. Saya selalu menaruh minat kepada kemajuan siswa
   pria dalam matematika.
   SS S N T ST
   1 2 3 4 5

6. Saya bersedia mendiskusikan karir yang menggu-
nakan matematika dengan siswa pria.
7. Saya menyepelekan siswa pria yang membicarakan matematika dengan sungguh-sungguh.  
8. Saya tidak dapat menaruh rasa hormat kepada siswa pria yang mengambil matematika.  
11. Saya kira siswa pria yang membicarakan karir yang menggunakan matematika itu tidak sungguh-sungguh.  
12. Saya tidak pernah berbicara dengan sungguh-sungguh tentang matematika kepada siswa pria.

MTASF

1. Saya selalu mendorong siswa wanita untuk belajar matematika lebih banyak  
2. Saya mempunyai kepercayaan bahwa siswa wanita pun dapat berhasil baik dalam matematika.  
3. Saya selalu mendorong siswa wanita yang bisa untuk belajar matematika lebih lanjut.  
4. Saya selalu mendorong siswa wanita untuk mengambil semua matematika yang dapat mereka kuasai.  
5. Saya selalu menaruh minat kepada kemajuan siswa wanita dalam matematika.  
6. Saya bersedia mendiskusikan karir yang menggunakan matematika dengan siswa wanita.  
7. Saya menyepelekan siswa wanita yang membicarakan matematika dengan sungguh-sungguh.  
8. Saya tidak dapat menaruh rasa hormat kepada siswa wanita yang mengambil matematika.  
11. Saya kira siswa wanita yang membicarakan karir yang menggunakan matematika itu tidak sungguh-sungguh.  
12. Saya tidak pernah berbicara dengan sungguh-sungguh tentang matematika kepada siswa wanita.
APPENDIX E2

MTASM AND MTASF IN ENGLISH
ATTITUDE TOWARD MATHEMATICS QUESTIONNAIRE
(for teacher)

Directions:
A. First, please write down your personal data.
   Name : ..............................................
   Sex : F or M
   Age : .............................................. years
   Status: ..............................................(e.g. JHS X teacher)

B. Your answers would not be known by any body else, but you and
   I (investigator). Your answers would be very useful for our na­
   tion. So, please, answer the questionnaire completely, seri­
   ously, and truthfully.

C. For each statement encircle 1 if you strongly agree (SA), 2 if
   you agree (A), 3 if you are not sure (N), 4 if you disagree
   (D), or 5 if you strongly disagree (SD).

D. Thank you very much for your good cooperation.

1. I have encouraged male students to study more mathematics.
2. I believe that male students could do well in mathematics.
3. I have encouraged male students that have abilities to go on in mathematics.
4. I would encourage male students to take all math they can.
5. I have been interested in male students' progresses in math.
6. I would talk to male students about a career which uses mathematics.
7. I have ignored male students who talk mathematics seriously.
8. I don't respect male students that take mathematics seri­
   ously.
9. I think advanced mathematics is a waste of time for male students.
10. Just once in a while I would talk to male students seriously on mathematics.

11. I think male students who talk on a career using mathematics are not serious.

12. I have never talked to male students seriously on mathematics.

MTASF

1. I have encouraged female students to study more mathematics.

2. I believe that female students could do well in mathematics.

3. I have encouraged female students that have abilities to go on in mathematics.

4. I would encourage female students to take all math they can.

5. I have been interested in female students' progresses in math.

6. I would talk to female students about a career which uses mathematics.

7. I have ignored female students who talk mathematics seriously.

8. I don't respect female students that take mathematics.

9. I think advanced mathematics is a waste of time for female students.

10. Just once in a while I would talk to female students seriously on mathematics.

11. I think female students who talk on a career using mathematics are not serious.

12. I have never talked to female students seriously on mathematics.
APPENDIX F

MATHEMATICS CONTENT IN THE SECONDARY SCHOOL CURRICULUM IN INDONESIA (1975 CURRICULUM)
A. JHS³ (grades 7, 8, and one half of grade 9)

1. Algebra
   1.1 an introduction to sets
   1.2 mathematical sentences: equations
   1.3 multiplication
   1.4 replacements and formulas
   1.5 inequalities and inequations
   1.6 negative numbers
   1.7 distributive law
   1.8 relations, mappings, and graphs.
   1.9 operations on integers and rational numbers
   1.10 equations and inequations in one variable
   1.11 further sets and graphs
   1.12 systems of equations and inequations in two variables
   1.13 formulas and literal equations
   1.14 sums, products, and squares
   1.15 functions, the quadratic function and its graphs
   1.16 factors and fractions

2. Geometry
   2.1 cube and cuboid
   2.2 angles
   2.3 coordinates
   2.4 rectangle and square
2.5 triangles
2.6 reflection
2.7 the parallelogram
2.8 locus and equations of a straight line
2.9 translation
2.10 the calculation of distance
2.11 similar shapes

3. Arithmetic
3.1 the system of whole numbers
3.2 decimal system of money, length, area, volume, and mass
3.3 fractions, ratios, and percentages
3.4 decimals and the metric system
3.5 introduction to statistics
3.6 social arithmetic
3.7 ratio and proportion
3.8 introduction to probability
3.9 squares and square roots of numbers
3.10 the circumference and area of a circle
3.11 statistics
3.12 areas and volumes
3.13 number patterns and sequences

B. JHS1B (grades 7, 8, and 9)

1. Mathematics contents in A
2. Algebra: quadratic equations and inequations
3. Geometry: an introduction to vectors
4. Arithmetic: logarithm
5. Trigonometry: the cosine, sine, and tangent functions

C. SHS1 (grades 7, 8, 9, and about one half of grade 10)

1. Mathematics contents in B
2. Algebra
   2.1 an introduction to matrices
3. Geometry
   3.1 rotational symmetry
   3.2 bilateral symmetry
4. Arithmetic
   4.1 further statistics
5. Trigonometry
   5.1 coordinate systems
   5.2 triangle formulas

D. SHS3 (grades 7, 8, 9, 10, 11, and 12)

1. Mathematics contents in C
2. Algebra
   2.1 irrational number and indices
3. Geometry
   3.1 dilatation
   3.2 circle (tangents, inscribed quadrilateral)
4. Arithmetic
   4.1 estimation of error
5. Three dimensions
   5.1 lines, planes, the intersection, angles and angle distance.

6. Algebra
   6.1 linear programming
   6.2 graphs, gradients, and areas
   6.3 systems of equations in two and three variables
   6.4 sequences and series
   6.5 matrices 2 (matrix properties, matrix operations and the properties)
   6.6 functions, composition of functions, and inverse functions
   6.8 quadratic equations and functions
   6.9 polynomials, remainder theorem, and the applications
   6.10 the exponential and logarithmic functions
   6.11 mathematical induction
   6.12 mathematical deduction and proof

7. Geometry
   7.1 composition of transformations 1
   7.2 the gradient and equations of a straight line
   7.3 vector 2 (vector of three dimensional)
   7.4 the equations of a circle
   7.5 composition of transformations 2 (transformation associated with matrix, using matrices, geometric transformation, inverse transformation)

8. Arithmetic
   8.1 counting systems (base 10, 2, less than 10, 12)
9. Trigonometry

9.1 sums and products of cosines and sines

9.2 the function \( f: x \mapsto a \cos x + b \sin x \), and the applications

10. Calculus

10.1 an introduction: the differential calculus

10.2 the integral calculus

10.3 further differentiation and integration

(Note: the topics from 6 to 10 are provided for the students of mathematics and science stream; the other streams have less heavier materials)
APPENDIX G

MATHEMATICS SCORES OF NINTH GRADERS IN MAT
1984/1985
## Mathematics Scores of 9th Graders in MAT
### 1984/1985

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</table>

Note, maximum score is 10.

Source: Planning Division Office, West Java Regional Office, Department of Education and Culture, Bandung.
APPENDIX H

MATHEMATICS SCORES OF SENIOR HIGH SCHOOL
GRADUATES IN CEEM (1983)
Mathematics Scores of Senior High School Graduates' in CEDM (1983)

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Note, maximum score is 50

Source: Academic Administration Center, IKIP Bandung, Bandung.