Mathematics in Public High Schools

By KENNETH E. BROWN, Specialist for Mathematics

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HEALTH, EDUCATION AND WELFARE.....OVETA CULP HOBBY, *Secretary*

Office of Education.....LEE M. THURSTON, *Commissioner*

Foreword

Bulletins on "Offerings and Enrollments in High School Subjects" have been issued by the Office of Education since 1890. The most recent of these bulletins is for the year, 1948–49. Since these publications are concerned with large numbers of schools and a great variety of subjects, their treatment is of a general nature.

Specific quantitative and qualitative information on particular subjects have been provided through recent reports such as "The Teaching of General Biology in Public High Schools of the United States" and "The Teaching of Science in Public High Schools." Reports of the national status of major areas of learning when compared with local conditions may provide a basis for needed improvements. It is hoped that this study into the extent and nature of mathematics education in the public high schools may serve such a purpose.

Many secondary school principals and teachers of mathematics expressed an interest in the facts of this study by writing notes and comments on the questionnaire used in gathering the data. To the teachers and principals who gave so generously of their time in supplying the data on which the study is based, the Office of Education is grateful.

WAYNE O. REED,
Assistant Commissioner,
Division of State and Local
School Systems.

GALEN JONES, *Director,*
Instruction, Organization,
and Services Branch.

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Nature of the Study

THIS STUDY reports data concerning (1) enrollments in mathematics and (2) administrative provisions for instruction in mathematics. The data are for the school year 1951–52 and the first semester of 1952–53. The scope and nature of this investigation were influenced by (1) suggestions of leaders in mathematics education as to information most needed in mathematics education and (2) nature of requests in correspondence concerning mathematics instruction to the United States Office of Education.

In developing and carrying out this study, the author has received valuable suggestions from the executive secretary, board of directors, past officers, and State representatives of the National Council of Teachers of Mathematics, and other leaders in mathematics education. The author also wishes to acknowledge the contributions of the many principals of the Nation's public high schools who furnished detailed data which made the study possible.

Characteristics of the Sample

The sample used in this study is 1,171 randomly selected high schools of the 23,746 public high schools of the United States. Of these 1,171 high schools, 965 provided all or part of the information requested. There were 857 public high schools that provided complete and usable information upon which this study is primarily based.

Table 1 compares the sizes of the 857 high schools with all high schools in the United States. It indicates that the schools in the study include a slightly larger percentage of large high schools and a smaller percentage of small high schools.

Table 2 compares, by each region, the high schools in the study with all the high schools of the United States. The types of high schools in the study are compared with the types of high schools of the United States in table 3. The number of pupils enrolled in each type of school in the study is compared with the enrollment in the United States in that type of school. These data are given in table 4.

It will be noted that although the percentage of junior high schools and junior-senior high schools in the study is slightly greater than the

percentage of those schools in the United States (table 3), the number of pupils enrolled in each type of school in the study (table 4), is representative of the enrollments in these types for the United States. The differences between the schools of the study and a truly representative sample of the high schools of the United States should be kept in mind if the reader interprets the findings of the study in terms of all public high schools. These adjustments, although small, have been made in data in the study where an estimate is made for the United States. However, with the exceptions noted, the schools in the study can be considered fairly representative of the public high schools of the United States.

Table 1.—A comparison, by size, of the number of schools in the study with the number of public high schools in the United States

Size of school, by enrollment	Schools—			
	In the United States (1951–52)		In this study	
	Number	Percent	Number	Percent
10–49	2,536	10.76	73	8.53
50–99	4,397	18.66	149	17.39
100–199	6,025	25.57	201	23.45
200–499	6,209	26.36	232	27.07
500 or more	4,395	18.65	202	23.57
Total	23,562	100.00	857	100.00

Table 2.—A comparison, by region, of the number of schools in the study with the number of public high schools in the United States

Geographic location of school		Schools—			
		In the United States (1951–52)		In this study	
Code [1]	Region	Number	Percent	Number	Percent
NEng	New England (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut)	1,007	4.24	43	5.01
MAtl	Middle Atlantic (New York, New Jersey, Pennsylvania)	2,301	9.70	97	11.31
ENC	East North Central (Ohio, Indiana, Illinois, Michigan, Wisconsin)	4,013	16.90	153	17.86
WNC	West North Central (Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas)	4,079	17.18	163	19.02
SAtl	South Atlantic (Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida)	3,776	15.90	107	12.49
ESC	East South Central (Kentucky, Tennessee, Alabama, Mississippi)	2,480	10.33	73	8.76
WSC	West South Central (Arkansas, Louisiana, Oklahoma, Texas)	3,765	15.85	126	14.71
Mtn	Mountain (Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada)	1,146	4.83	46	5.36
Pac	Pacific (Washington, Oregon, California)	1,229	5.17	47	5.48
	Total	23,746	100.00	857	100.00

[1] This code will be used in other tables in this study.

Table 3.—A comparison, by type, of the number of schools in the study with the number of public high schools in the United States

Code [1]	Type of school	Schools—			
		In the United States (1951-52)		In this study	
		Number	Percent	Number	Percent
JHS	Junior high school	3,227	13.59	129	15.05
Reg	Regular (4-year) and senior	11,928	50.22	368	42.95
J-Sr	Junior-Senior and undivided	8,591	36.19	360	42.00
	Total	23,746	100.00	857	100.00

[1] This code will be used in other tables in this study.

Table 4.—A comparison, by type of school, of the enrollments reported in this study with the enrollments of the public high schools of the United States

Type of school [1]	Enrollment			
	In the United States (1951–52)		In schools in this study (1952–53)	
	Number	Percent	Number	Percent
JHS	1,526,996	19.85	62,434	19.12
Reg	3,465,216	45.07	149,035	45.63
J-Sr	2,696,707	35.08	115,171	35.25
Total	7,688,919	100.00	326,640	100.00

[1] For meaning of code indicating type of school, see table 3.

Seventh-and Eighth-Grade Mathematics

Offerings and Enrollments

Mathematics, unlike most fields of learning, has two courses which are being offered at the seventh-and eighth-grade level. To provide experiences in mathematics that will meet the needs of the pupils more effectively than traditional arithmetic, topics from several areas of mathematics are correlated into a single subject which is given the title "general mathematics." The subject, although a recent addition to the curriculum when compared with arithmetic, is becoming accepted as a subject for the seventh and eighth grades.

The reports from the schools in this study indicate that general mathematics is more popular in the junior high school than in the combined junior-senior high school. Also, the percent of students enrolled in general mathematics is much greater in the larger schools (see tables 5 and 6). In fact, table 6 shows that the percent of students in the seventh grade enrolled in general mathematics ranges from 4 to 23 depending on the size of the school. Similarly, in the eighth grade, if in a large

school, the percentage enrolled in general mathematics is twice that of the small schools.

Table 5.—Enrollment in seventh-and eighth-grade mathematics, by type of school

Subject	1st semester, 1951–52				1st semester, 1952–53			
	Junior high school		Junior-senior high school		Junior high school		Junior-senior high school	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Arithmetic 7	13,982	78	13,123	87	15,054	73	13,683	86
General mathematics 7	3,891	22	1,982	13	5,545	27	2,149	14
Arithmetic 8	13,995	81	14,498	80	15,851	79	15,572	81
General mathematics 8	3,345	19	3,570	20	4,134	21	3,562	19

Table 6.—Distribution, by size of school, of the percent of pupils in the seventh and eighth grade enrolled in general mathematics, first semester, 1952–53

Size of school, enrollment	Percent of enrollment in general mathematics	
	7th grade	8th grade
10–49	12	10
50–99	14	12
100–199	4	10
200–499	23	19
500 or more	23	22

Table 7.—Distribution, by region, of the percent of pupils in the seventh and eighth grade enrolled in general mathematics, first semester, 1952–53

Region [1]	Percent of enrollment in general mathematics	
	7th grade	8th grade
New England	44	47
Middle Atlantic	27	19
East North Central	9	8
West North Central	19	17
South Atlantic	37	39
East South Central	17	18
West South Central	18	13
Mountain	2	1
Pacific	11	13

[1] For meaning, see table 2.

Although the size and type of the school seem to affect the percent of students enrolled in general mathematics, the geographic location of the schools is more of a determining factor. For example, table 7 shows that in one geographic region only 2 percent of the students of the seventh grade are enrolled in general mathematics while in another region 44 percent are so enrolled. The variation among regions is even greater in the percent of eighth-grade students who are enrolled in this subject.

Several questions might be raised as one observes tables 6 and 7. If the seventh-and eighth-grade curriculum should be non-specializing subjects—a general education required of all students—why should both general mathematics and arithmetic be offered? If general mathematics is offered for the slower pupil, as seems to be the case for the ninth-grade pupils in many schools, why should there be 22 times as many pupils in general mathematics in one region as in another region? Are there 22 times as many slow pupils in that region? These and similar questions may imply that there is not an agreement as to the purposes, content, and values of general mathematics.

According to the reports of the schools in this study, 1 out of 5 children in the seventh and eighth grades is enrolled in general mathematics (see table 8).

Table 8.—Enrollment of schools used in study and estimated enrollment for all public high schools in seventh-and eighth-grade mathematics

Subject	Enrollment, first semester, 1952–53	
	Schools in this study	Schools in United States [1]
Arithmetic 7	28,737	731,200
General mathematics 7	7,694	195,700
Arithmetic 8	31,470	823,500
General mathematics 8	7,800	204,100

[1] Estimate based on data in this study.

Time Allotted

The number of class periods per week and the number of weeks the course meets varies only slightly among schools. However, there is a great variation in the length of class period. Approximately 17 percent of the schools reported a class period of 60 to 69 minutes in eighth-grade arithmetic and 12 percent reported 40 to 44 minutes (see table 9) thus, some of the schools are spending 50 percent more time on the subject than other schools. Approximately 40 percent of the schools reported class periods between 50 to 59 minutes; however, the other 60 percent of the schools reported periods ranging in length from 30 to 70 minutes. Many of the schools that reported the long class periods indicated that part of the period of instruction was devoted to supervised study. However, in all cases the length of the period is the time spent by the student under the direct supervision of the teacher of mathematics.

There was little variation of length of class period of schools of different size and type. There was a difference in the time spent on both arithmetic and general mathematics among schools in the various geographic regions. Table 10 shows this difference for seventh-grade arithmetic. Similar variations were observed in the cases of eighth-grade arithmetic and general mathematics. From the data furnished by these schools, one

concludes that not all students in the seventh and eighth grades receive equal time in instruction in mathematics.

Table 9.—Distribution, by length of period, of the percent of schools offering seventh-and eighth-grade mathematics

Subject	Percents of schools, by length of period (minutes)					
	39 or less	40–44	45–49	50–59	60–69	70 or more
Arithmetic 7	3	12	30	39	16	(1)
General mathematics 7	0	11	28	46	15	0
Arithmetic 8	3	12	29	39	17	(1)
General mathematics 8	0	7	20	54	19	0

[1] Less than 1 percent of the schools that offered the subject had class periods of the length indicated.

Table 10.—Distribution, by length of class period and region, of the percent of schools offering seventh-grade arithmetic

Region [1]	Number of schools	Percent of schools, by length of period (minutes)				
		39 or less	40–44	45–49	50–59	60–69
NEng	14	0	58	28	7	7
MAtl	53	0	22	34	35	1
ENC	80	1	16	36	42	5
WNC	48	10	10	10	57	13
SAtl	29	0	0	13	69	18
ESC	47	4	6	37	14	39
WSC	63	6	4	30	30	28
MTN	17	5	5	60	18	12
Pac	16	0	0	12	32	6

[1] For meaning of code indicating region, see table 2.

Field Trips

Among the many suggestions by leaders in mathematics education for enriching the instruction in mathematics is the use of field trips. The purposes usually given are to make the mathematical experiences of the classroom more meaningful and motivate the study of the subject. However, a well-planned field trip might contribute to the building of desirable community relations.

For example, a class that is studying measurement might visit a factory where precision measurement is used. In planning the field trip the management of the factory could become aware of the purposes and tasks of the school and thus very desirable public relations could develop.

Table 11 shows that approximately 9 percent of the schools reported the use of field trips as a regular part of the instruction in seventh-and eighth-grade mathematics. Schools are using this direct way of answering the age-old question of pupils, "Where will anyone ever use this mathematics?"

The use of field trips seems to be more popular in the junior high school. In fact, in this study the percent of schools that used field trips

in seventh-and eighth-grade mathematics in the junior high school was three times the percent of schools in the combined junior-senior high schools that use this learning procedure. The climatic region or size of the school might prevent the use of field trips. However, table 11 does not warrant this conclusion.

Teachers of all types and sizes of schools are making only limited use of field trips as a regular part of their instruction in seventh-and eighth-grade mathematics. If field trips are a good type of meaningful instruction in mathematics, the percentage of schools using them might well be increased.

Table 11.—Number and percent of schools which report the use of field trips in seventh-and eighth-grade mathematics

A. BY TYPE OF SCHOOL

Subject	Junior high school		Junior-senior high school		Total	
	Number	Percent	Number	Percent	Number	Percent
Arithmetic 7	24	19	21	6	45	9
General mathematics 7	1	(1)	3	(1)	4	(1)
Arithmetic 8	10	8	28	8	38	8
General mathematics 8	1	(1)	2	(1)	3	(1)

B. BY SIZE OF SCHOOL

Subject	Number of schools, by size (enrollment)				
	10–49	50–99	100–199	200–499	500 or more
Arithmetic 7	4	6	10	5	20
General mathematics 7	0	1	1	2	0
Arithmetic 8	4	8	11	10	5
General mathematics 8	0	1	1	1	0
Number of schools in study	73	149	201	232	202

C. BY REGION

Subject	Number of schools, by region [2]									Total	
	NEng	MAtl	ENC	WNC	SAtl	ESC	WSC	Mtn	Pac	Number	Percent
Arithmetic 7	3	2	19	1	5	3	11	1	0	45	9
General mathematics 7	0	0	1	0	0	2	1	0	0	4	(1)
Arithmetic 8	3	2	6	3	5	2	14	3	0	38	8
General mathematics 8	0	0	0	0	1	1	1	0	0	3	(1)
Number of schools in study	43	97	153	163	107	75	126	46	47	857	

[1] Less than 1 percent.
[2] For meaning of code indicating region of school, see table 2.

Ninth-Grade Mathematics

The graduate of an eight-grade elementary school usually finds the 4-year high school quite different from his previous educational exper-

iences. The step in education has been so abrupt for many pupils that it has been a terminal point in their formal education.

Now this abrupt transition period is experienced by only half the pupils in the United States due to the expansion of the junior high school and junior-senior high school. With the increase of the junior high school and the attempt to provide experiences in mathematics as a part of a general education program, general mathematics for the ninth-grade pupil has been developed. During the last 30 years, it has become a major offering for pupils in the ninth grade.

Offerings and Enrollments

Table 12 presents, by type of school, the enrollments in ninth-grade mathematics for the first semesters, 1951–52 and 1952–53. It will be observed that there is little change in the percent of students enrolled in either algebra or general mathematics between the two semesters. In both semesters, of the students enrolled in ninth-grade mathematics, approximately 40 percent were in general mathematics. In each semester the percent of students enrolled in general mathematics was greater in regular 4-year and senior high school than in combined junior-senior high school.

Table 12.—Enrollment in ninth-grade mathematics, by type of school, [1] ***first and second semesters, 1951–52***

A. FIRST SEMESTER, 1951–52

Subject	Junior high school		Regular senior high school		Junior-senior high school	
	Number	Percent	Number	Percent	Number	Percent
Elementary algebra	6,031	54	20,785	63	13,216	65
General mathematics	5,086	46	12,297	37	7,231	35

B. SECOND SEMESTER, 1951–52

Subject	Junior high school		Regular senior high school		Junior-senior high school	
	Number	Percent	Number	Percent	Number	Percent
Elementary algebra	8,987	53	22,743	62	14,015	63
General mathematics	7,932	47	14,030	38	8,228	37

[1] For meaning of type of school, see table 3.

If the enrollments in general mathematics and algebra are determined by the ability of the students, we would expect the percentage of the students enrolled in the subject to be constant irrespective of size of school. The percentages are approximately equal except in the case of the large schools (see table 13). In this case, the percent enrolled in general mathematics increases. Of course, all leaders in mathematics education do

not agree that a two-track plan, if desirable, should be based upon algebra and general mathematics. In fact, many teachers are quick to point out that mathematics in the ninth grade is part of a general education program. Some persons contend that general mathematics properly taught is more profitable to even the superior student than algebra. However, an examination of the textbooks used in the courses in general mathematics indicates that in most cases the content material is not designed to challenge the superior student.

Table 13.—Distribution, by size of school, of the percent of ninth-grade pupils enrolled in elementary algebra and general mathematics, first semester, 1952–53

Subject	Percent of enrollment, by size of school				
	10–49	50–99	100–199	200–499	500 or more
Elementary algebra	63	62	62	64	58
General mathematics	37	38	38	36	42

Table 14.—Distribution, by region, of the percent of ninth-grade pupils enrolled in general mathematics, first semester, 1952–53

Region	Percent of pupils	Region	Percent of pupils
New England	32	East South Central	28
Middle Atlantic	38	West South Central	31
East North Central	43	Mountain	37
West North Central	35	Pacific	43
South Atlantic	53		

Table 14 indicates that the percent of ninth-grade pupils enrolled in general mathematics changes markedly from one geographic location to another. More than 50 percent of the ninth-grade pupils in one region are enrolled in general mathematics, while only 28 percent are so enrolled in another region. There is evidence[1] that the deviation in enrollments, by State, is still greater.

In table 15 the number of students enrolled in general mathematics and algebra for the first semester of 1951–52 and 1952–53 may be observed. An estimate based on this study indicates that in 1952–53 there were more than 1 million students enrolled in algebra in the United States and nearly three-fourths of a million in general mathematics.

Table 16 shows that the enrollment in algebra decreased 12 percent from the first semester to the second semester in 1951–52. This decrease was 14 percent for boys and 9 percent for girls. The decrease in total enrollment of pupils in general mathematics is similar to that of algebra; however, in the case of general mathematics the greater decrease is among the girls.

[1] Wahlstrom, Lawrence F. The Status of the Teaching of High-School Mathematics in the State of Wisconsin, Madison, Wis., University of Wisconsin 1952.

Several questions might be raised regarding the decrease in enrollment between semesters. Do these students, 12 to 13 percent of the pupils in ninth-grade mathematics, drop out of school? Do they fail the course and never repeat it? Why is the percent of decrease in algebra greater among the boys? Are they less apt in algebra? Is it taught so it is more interesting to girls? Do the girls need algebra more than the boys? Similar questions might be raised concerning the loss of enrollment in general mathematics between the two semesters. More detailed data on enrollments have been included in the appendix.

Table 15.—Enrollment in ninth-grade mathematics for first semesters, 1951–52 and 1952–53

Subject	Enrollment for first semester, by year		
	For schools in study		Estimated for United States 1952–53
	1951–52	1952–53	
Elementary algebra	39,932	45,745	1,135,800
General mathematics	24,614	30,190	749,600

Table 16.—Enrollment in ninth-grade mathematics for first and second semesters, 1951–52

Subject	Enrollment, by semester						Percent of decrease		
	First semester			Second semester					
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Elementary algebra	18,161	17,078	39,932	15,598	15,531	34,945	14	9	12
General mathematics	11,195	10,363	24,614	9,845	8,786	21,352	12	15	13

Grade Level of Pupils

Although elementary algebra and general mathematics are termed ninth-grade subjects, not all the students enrolled in the courses are on the ninth-grade level. Table 17 shows that of the students in this study 20 percent of the students enrolled in algebra were in the tenth grade. In fact, a few students—less than 1 percent—were postgraduate.

Table 17.—Distribution, by grade, of the percent of pupils enrolled in algebra and general mathematics

Subject	Percent of enrollment, by grade			
	9	10	11	12
Algebra	76	20	3	1
General mathematics	81	12	4	3

From table 18 it will be observed that in one region 16 percent of the elementary algebra students are in the 10th grade, while in another region there are 30 percent in that grade. It has been reported[8] that in one State more than 50 percent of the pupils in elementary algebra are in the 10th grade. Likewise general mathematics is not confined to the students of one grade level. In the schools in this survey, 12 percent of the students in 9th-grade general mathematics were in the 10th grade and 3 percent in the 12th grade. In fact, in one region 13 percent of the pupils in ninth-grade general mathematics were in the 11th grade and 6 percent in the 12th grade.

Table 18.—Distribution, by grade within region, of the percent of pupils enrolled in algebra and general mathematics

Region [1]	Subject	Percent of enrollment, by grade			
		9	10	11	12
New England	Algebra	79	17	3	[2]
	General mathematics	88	11	[2]	[2]
Middle Atlantic	Algebra	80	16	3	1
	General mathematics	82	14	[2]	3
East North Central	Algebra	80	16	2	1
	General mathematics	74	21	2	3
West North Central	Algebra	80	16	3	1
	General mathematics	90	8	[2]	1
South Atlantic	Algebra	68	29	2	[2]
	General mathematics	76	5	13	6
East South Central	Algebra	69	26	3	2
	General mathematics	92	8	0	[2]
West South Central	Algebra	81	17	1	1
	General mathematics	95	3	[2]	2
Mountain	Algebra	65	30	2	3
	General mathematics	84	12	2	1
Pacific	Algebra	64	27	7	2
	General mathematics	71	21	3	5

[1] For meaning of region of school, see table 2.
[2] Less than 1 percent.

Required for Graduation

More than half of the schools in this study require algebra of college-preparatory students for graduation. More than one-third of the schools required the subject of all students. On the one hand, it would seem that even a larger percent of college-bound students could profit from experiences in algebra. Knowledge in many fields cannot be pursued on the college level without an understanding and skill in the use of equations, the formula, and graphic data. On the other hand, many educators might doubt the wisdom of requiring algebra of each student irrespective of his educational goal. Perhaps they would disagree with the group of schools (37 percent) that require algebra of all students and agree with the group of schools (28 percent) who require general mathematics.

The difference in graduation requirements concerning ninth-grade mathematics is quite marked (see table 19). In one geographic region, 65 percent of the schools require algebra of all students for graduation.

[8] Ibid.

In another region, only 14 percent of the schools in the study require the course of all students. There was more uniformity among schools in requiring general mathematics for graduation. The percent of schools requiring the subject for graduation ranges from 21 to 39. In some cases the graduation requirement includes algebra *or* general mathematics and in other cases algebra *and* general mathematics. Several schools indicate that no mathematics is required, but students are usually guided into the type of mathematics best suited to their abilities and interests. The latter procedure is being advocated by many educators with the caution that proper student counseling is a prerequisite for its success.

Table 19.—Distribution of the percent of schools that require algebra and general mathematics of college-preparatory and all students

A. BY TYPE AND SIZE

Subject	Students	Percent of schools, by type and size							
		Type [1]			Size—enrollment [1]				
		Junior-high school	Regular Senior high school	Junior-Senior high school	10-49	50-99	100-199	200-499	500 or more
Elementary algebra	College-preparatory	39	65	56	52	59	52	56	63
Elementary algebra	All	12	41	41	45	44	43	54	25
General mathematics	All	18	30	30	29	29	29	27	28

B. BY REGION

Subject	Students	Percent of schools, by region [1]								
		NEng	MAtl	ENC	WNC	SAtl	ESC	WSC	Mtn	Pac
Elementary algebra	College-preparatory	56	55	52	54	61	48	69	54	68
Elementary algebra	All	16	14	30	42	33	48	66	35	23
General mathematics	All	21	25	25	31	39	24	25	30	30

[1] For meaning of type, size, and region of school, see tables 1, 2, and 3.

Table 19–A shows that the percent of schools requiring algebra of all students for graduation is greater for the small school. This may be due in part to the small enrollment which limits the courses offered in the ninth grade. However, a smaller percent of these schools required the subject for graduation of college-preparatory pupils. In the case of general mathematics, approximately 28 percent of the schools required the subject for graduation irrespective of size of the school.

The most marked difference in graduation requirements is among types of schools (see table 19–A). The more specific requirements are reported by the senior and regular 4-year high school. Sixty-five percent of the schools of this type reported that algebra was required of college-preparatory students and 41 percent of these same schools require the

subject of all students. Of the junior high schools of the study, 39 percent required algebra of college-preparatory students and 12 percent required the subject of all students. Of the percentage of schools requiring general mathematics, the regular high school exceeds the junior high school. These data emphasize the more specific and detailed requirements of the 4-year high school. Perhaps detailed course requirements also indicate less provision for individual differences through guidance and counseling.

Time Allotted

The number of periods devoted to ninth-grade mathematics is usually 5 per week for 36 weeks (see table 20). The variation in schools in this respect is slight; however, there is a marked difference among schools in regard to the length of class period. Table 21 shows that 40 percent of the schools in the study reported a class period of 50–59 minutes; however, approximately 20 percent of the schools reported more than 60 minutes and 13 percent less than 45 minutes. Thus, many ninth-grade pupils are devoting 50 percent more time to mathematics than other pupils in that grade.

Table 20.—Distribution of the percent of schools devoting the indicated number of periods per week to ninth-grade mathematics

Subject	Percent of schools, by number of periods		
	3	4	5
Algebra	(1)	3	97
General mathematics	(1)	2	98

[1] Less than 1 percent of the schools in this study.

Table 21.—Distribution, by length of period, of percent of schools offering subject

Subject	Percent of schools, by length of period (minutes)					
	39 or less	40–44	45–49	50–59	60–69	70 or more
Algebra	(1)	13	25	40	22	(1)
General mathematics	(1)	13	26	43	18	(1)

[1] Less than 1 percent of the schools in this study had class periods of the indicated length.

Field Trips

Many educational leaders have recommended the use of field trips in making the application of mathematics more meaningful, in showing the use of mathematics in general education, and for motivating the further study of mathematics. Of the 857 schools in the study, only 32 reported the use of field trips in algebra and 46 schools indicated that field trips were used in teaching general mathematics.

Table 22.—Distribution, by type, size, and region, of the percent of schools which reported the use of field trips in ninth-grade mathematics

A. BY TYPE AND SIZE [1]

Subject	Percent of schools, by—							
	Type [1]			Size—enrollment				
	Junior high school	Regular senior high school	Junior-senior high school	10–49	50–99	100–199	200–499	500 or more
Algebra	5	2	4	3	3	5	3	3
General mathematics	5	5	6	7	7	5	5	3

B. BY REGION [1]

Subject	Percent of schools, by region [1]									Total	
	NEng	MAtl	ENC	WNC	SAtl	ESC	WSC	Mtn	Pac	Number	Percent
Elementary algebra	0	4	4	4	5	5	9	1	0	32	4
General mathematics	0	3	4	7	9	4	13	4	2	46	5
Total number of schools	43	97	153	163	107	75	126	46	47	857	100

[1] For meaning of code indicating region and type of school, see tables 2 and 3.

Table 22–A indicates that the size of the school has little effect on the use of field trips in instruction in algebra. However, the percentage of small schools reporting field trips in general mathematics is approximately twice that of the large schools. Also table 22–A indicates that the use of field trips does not depend on the type of school.

As shown in table 22–B, the number of schools that reported field trips for each region is so small that few conclusions can be drawn concerning each region except that most schools do not include field trips as a part of the instruction in ninth-grade mathematics. Perhaps properly planned field trips would make the mathematics experiences of the classroom more meaningful to the pupil.

Tenth-Grade Mathematics

Offerings and Enrollments

More than half a million children in the United States are enrolled in geometry which was one of the first subjects in the public high-school curriculum.

The schools in this study reported enrollments in geometry equal to approximately 34 percent of the enrollment of the tenth grade. Table 23–A shows that the percent of students enrolled in geometry was the same for both the junior-senior high school and the regular and senior high school and that there is a small increase in the enrollments in this subject from 1951–52 to 1952–53.

Table 23.—Distribution, expressed in percentage, of the ratio of the enrollment in geometry to the enrollment in the 10th grade

A. BY TYPE AND SIZE

Period	Ratio of enrollment, by type and size						
	Type		Size—enrollment				
	Regular senior high school	Junior-Senior high school	10–49	50–99	100–199	200–499	500 or more
1st semester, 1951–52	32	32	36	35	31	30	32
1st semester, 1952–53	35	34	35	36	31	34	34

B. BY REGION, FIRST SEMESTER, 1952–53

Period [1]	Percent of enrollment, by region								
	NEng	MAtl	ENC	WNC	SAtl	ESC	WSC	Mtn	Pac
1st semester, 1952–53	42	37	34	32	23	35	37	39	32

[1] For meaning of code indicating region, see table 2. Table should be read as follows: In the New England region, the number of pupils enrolled in geometry is equal to 42 percent of pupils in the tenth grade in that region.

Table 23–A indicates that the size of the school has little effect on the percent of students who enroll in geometry, while the geographic location is an important factor. Table 23–B shows that in one region the enrollment in the subject was only 23 percent of the tenth grade, while in another region it was 42 percent.

In surveys[3] that have been made of reasons for teaching geometry, "to teach the student to think logically" and "to understand the meaning of deductive proof" were the reasons most frequently given. If these objectives are being realized from the teaching of geometry, the following question might be raised: Do less than one-fourth of the students need these experiences in one region and nearly half of the students need them in another region?

The enrollments in geometry were 20,725 for the first semester 1951–52 and 22,527 for the first semester 1952–53. The estimated enrollment for the United States, based on this study, is 559,000 for the first semester 1952–53.

The decrease in enrollment between the first and second semesters of 1951–52–1952–53 was 14 percent—18 percent decrease in the enrollment of the boys and 11 percent in the enrollment of the girls. Why does nearly one out of five boys find his experiences unsatisfactory in geometry? Is it more difficult to teach boys the meaning of deductive proof? Is geometry taught as a memory course which girls will endure more willingly than boys? These and kindred questions may not lend themselves to a general answer, but their solutions are important if geometry is to be meaningful to the pupils.

[3] Brown, Kenneth E., Why Teach Geometry? *The Mathematics Teacher*, 43: 103, March 1950. Shibli, J., Recent Developments in the Teaching of Geometry, State College, Pa., J. Shibli, Publisher, 1932.

Grade Level of Pupils

Geometry confines its enrollment primarily to the tenth and eleventh grades. There are exceptions as indicated in table 24. Approximately 2 percent of those enrolled in geometry were ninth-grade pupils and 8 percent were in the twelfth grade. However, 64 percent of those students enrolled in geometry are in the tenth grade. The college freshmen who take high-school geometry without credit are not included in this study.

Table 24.—Distribution, by size and region of school, of the percent of pupils, by grade, enrolled in plane geometry

Classification of school	Percent of pupils enrolled, by grade			
	9	10	11	12
A. By size: [1]				
10–49	7	41	30	22
50–99	0	59	32	9
100–199	7	43	31	19
200–499	5	48	37	10
500 or more	(2)	71	24	5
B. By region: [1]				
New England	(2)	73	23	4
Middle Atlantic	(2)	71	25	4
East North Central	2	79	15	4
West North Central	5	62	21	11
South Atlantic	(2)	35	50	15
East South Central	0	52	37	11
West South Central	5	30	49	16
Mountain	6	66	23	5
Pacific	(2)	71	22	7
Total	2	64	26	8

[1] For meaning of size and region, see tables 1 and 2.
[2] Less than 1 percent.

In the large schools, as shown in table 24, 71 percent of the enrollment were 10th-grade pupils. The greater number of 11th-grade students in geometry in the smaller schools is partly due to the offering of geometry in alternate years. For example, in a school with a small enrollment, advanced algebra will be offered in 1951–52 for 10th and 11th grade and in 1952–53 plane geometry will be available to the 10th-and 11th-grade pupils. This procedure permits the student of very small schools to have experiences in algebra (9th grade), advanced algebra, and plane geometry (10th and 11th grades).

Table 24–B shows the distribution of pupils enrolled in plane geometry by grades within regions. In one region 50 percent of the geometry pupils are in the 11th grade and 15 percent in the 12th grade. In another region there are 15 percent in the 11th grade and only 4 percent in the 12th grade. These data reflect the wide variation in this grade placement of geometry in the various schools. The only schools to report postgraduates enrolled in geometry were in the West North Central region. The schools in this region reported that 4 percent of the students enrolled in geometry are postgraduates.

Required for Graduation

Eight percent of the schools in this study reported that plane geometry was required of all students for graduation. Two out of five schools require the subject of all college-preparatory pupils.

Table 25–A presents the graduation requirements in geometry by type of school. Approximately the same percent of schools in each type reported that geometry was a graduation requirement of college-preparatory students; however, twice as many junior-senior high schools required the course of all students as did the regular 4-year senior high schools.

Table 25–B shows that 43 percent of the larger schools require geometry of the college-preparatory student, while only 25–30 percent of the smaller schools have this requirement. However, the larger schools seldom require geometry of all students for graduation.

Table 25.—Distribution, by type, size, and region, of the percent of schools that require plane geometry of college-preparatory and all students

Classification of school	Percent of schools, by type of student	
	College-preparatory	All
A. By type: [1]		
Regular (4-year) and senior high school	42	5
Junior-senior high school	39	11
B. By size: [1]		
10–49	25	14
50–99	27	6
100–199	29	13
200–499	39	6
500 or more	43	1
C. By region: [1]		
New England	49	2
Middle Atlantic	41	8
East North Central	34	3
West North Central	21	5
South Atlantic	37	5
East South Central	28	13
West South Central	36	18
Mountain	41	2
Pacific	47	2

[1] For meaning of type, size, and region, see tables 1, 2 and 3.

Even a greater variation among schools in requiring geometry for graduation of all pupils is shown in table 25–C. In three geographic regions, only 2 percent of the schools reported they required geometry for graduation of all students, while in one region 18 percent of the schools had such a requirement. Even the same requirement for college-preparatory pupils varies from 21 to 49 percent of the schools depending on the region.

Many schools stated that geometry was not a graduation requirement; however, if the student expected to enter a college curriculum where it would be needed, this need would be pointed out by the student's counselor. Perhaps this variation in graduation requirements should raise such questions as: If the primary purpose of geometry is to teach better

methods of thinking through deductive proof,[4] then should it not be a part of the general education program of all pupils? If it is a part of the general education of pupils, should it be a graduation requirement in all high schools? There are persons who will not agree that this is the purpose of geometry.[5] However, such objectives as a knowledge of deductive proof, critical thinking, and logical reasoning have been rated high among the purposes for teaching geometry by many leaders in mathematics education. If the objectives for teaching plane geometry are not general education in nature, why should geometry be required for graduation of all students?

Time Allotted

In general, geometry classes meet 5 periods each week for 36 weeks. In this study, 98 percent of the schools reported that 5 periods per week were devoted to geometry and 2 percent met four periods per week.

This uniformity among schools was lacking in the case of the length of the periods. Twenty-three percent of the schools in the study reported class periods of 60 minutes or more in length. In contrast to this, 15 percent of the schools had geometry classes of less than 45 minutes. Twenty-four percent of the schools had class periods of 45–49 minutes and only 38 percent of the schools reported periods in geometry classes of 50–59 minutes.

Size of Classes

In this study, only four classes, less than one-half of 1 percent of the classes reported, were above 40 students in enrollment. However, 25 percent of the classes had enrollments between 31–40. Thirty-eight percent of the classes had 21–30 pupils; 24 percent, 11–20 pupils; and 13 percent, 1–10 pupils.

Use of Field Trips in Teaching Geometry

Only 7 percent of the schools reported the use of field trips in teaching geometry. Table 26–A reveals that the percent of the junior-senior type of school using field trips is slightly higher than the regular 4-year and senior high school. Table 26–B shows that the percent of high schools using field trips in geometry in the study is less among the large schools. A small enrollment or limited staff does not seem to prevent schools from providing field trips in geometry.

Table 26–C gives, by region, the number of schools that reported field trips. Because the number of schools reported in each region is small

[4] Fawcett, Harold P. The Nature of Proof. Thirteenth Yearbook of the National Council of Teachers of Mathematics. New York City, Teachers College, Columbia University, 1938.

[5] National Council of Teachers of Mathematics. The Place of Mathematics in Secondary Education. Fifteenth Yearbook. New York City, Teachers College, Columbia University, 1940.

we should deduce generalizations with caution. For example, if after observing that no school in the New England region reported the use of field trips we concluded that the cold weather in the region makes the field trip impossible, the Mountain and Pacific regions would not substantiate the assumption. In fact, in the Mountain region, five times as many schools reported the use of field trips as the Pacific region. Perhaps one conclusion is valid. Field trips are seldom used by the schools in this study in the teaching of geometry.

Table 26.—Distribution, by type, size, and region, of the schools which reported the use of field trips in geometry

Classification of school	Schools	
	Number	Percent
A. By type: [1]		
Regular (4-year) and senior high school	23	6
Junior-senior high school	33	9
B. By size: [1]		
10–49	3	4
50–99	8	5
100–199	24	12
200–499	16	7
500 or more	7	3
C. By region: [1]		
New England	0	0
Middle Atlantic	8	8
East North Central	9	6
West North Central	7	4
South Atlantic	9	8
East South Central	6	8
West South Central	12	9
Mountain	6	13
Pacific	1	2
Total	58	7

[1] For meaning of type, size, or region, see tables 1, 2, and 3.

Eleventh-Grade Mathematics

Offerings and Enrollments

Of the mathematics classes of the last 4 years of high school, intermediate algebra is exceeded in enrollment only by elementary algebra, general mathematics, and plane geometry. The schools in this study reported an enrollment of more than 13,000 students in intermediate algebra which was approximately 23 percent of the number of students enrolled in the eleventh grade (see table 27). The percent of 11th-grade students enrolled in the course was approximately the same for both the regular and senior high school and the combined junior-senior high school. There was an increase in the actual number of students enrolled in first semester, 1952–53, from the previous year; however, the increase in the total high-school enrollment causes the percent of high-school students in intermediate algebra to remain approximately constant.

Table 27.—Distribution, expressed in percentage, of the ratio of the enrollment in intermediate algebra to the enrollment in the 11th grade

A. BY TYPE OF SCHOOL[1]

Period	Regular senior high school		Junior-senior high school	
	Number	Percent	Number	Percent
1st semester, 1951–52	8,378	23	3,865	23
1st semester, 1952–53	8,999	24	3,963	23

B. BY SIZE OF SCHOOL[1]

Period	Percent of enrollments, by size of school				
	10–49	50–99	100–199	200–499	500 or more
1st semester, 1951–52	20	19	23	25	24
1st semester, 1952–53	11	21	25	26	24

C. BY REGION OF SCHOOL[1]

Period	Percent of enrollment, by region								
	NEng	MAtl	ENC	WNC	SAtl	ESC	WSC	Mtn	Pac
1st semester, 1952–53	28	30	13	14	34	31	51	14	14

[1] For meaning of type, size, and region of school, see tables 1, 2, and 3.

Table 27–B shows that the larger schools reported a slightly higher percentage of the 11th-grade students enrolled in intermediate algebra. Many of the smaller schools indicated that the subject was offered every other year and that 10th-11th-and 12th-grade students were enrolled in the subject.

Although the percentage of students enrolled in intermediate algebra was approximately constant irrespective of type or size of school, there was a wide variation between schools in different geographic locations. The schools in one region reported that the enrollments in intermediate algebra were equal to more than half of the 11th-grade pupils, while another region reported only 13 percent (see table 27–C). The probability that a pupil will study intermediate algebra depends more upon the geographic location of the school than upon the type or size of the school. The subject is often recommended for those students who plan to continue the study of mathematics or its related fields. Would it be valid to assume that four times as many pupils in the West South Central region than in the East North Central region will pursue advanced work in mathematics? (see table 27–C).

There was a decrease in the enrollment in intermediate algebra between the first and second semesters of 1951–52. The decrease in enrollment was 26 percent for the girls and 32 percent for the boys. The total loss was 29 percent in pupils enrolled in intermediate algebra. Several factors contributed to the decrease in enrollment. Approximately 20

percent of these courses are half-year courses. According to the data in this study, two-thirds of these half year courses are offered the first semester and one-third the second semester. Due to this fact, there would be a decrease of 5 percent between the enrollments of the two semesters. However, the half-year courses do not account for all the decrease in enrollments. In fact, such questions might be raised as: Are pupils being misguided into intermediate algebra? Is the course filling the needs of this group of students who drop out? Approximately one-third of a million pupils were enrolled in intermediate algebra in the United States the first semester, 1952–53; should we expect the enrollment to decrease one-third the second semester?

Grade Level of Pupils

Although intermediate algebra is considered the eleventh-grade mathematics subject in this study, the 11th-graders comprised only 51 percent of those enrolled in the subject (see table 28–C). This is due primarily to two facts. (1) Many small schools enroll 10th-and 11th-or 11th-and 12th-grade students in the course to obtain an enrollment that will justify offering the subject even in alternate years. (2) Some schools are recommending that the pupil take intermediate algebra before he takes plane geometry.

Table 28.—Distribution, by size and region of school, of the percent of pupils, by grade, enrolled in intermediate algebra

Classification of school	Percent of pupils enrolled, by grade				
	9	10	11	12	Postgraduate
A. By size: [1]					
10–49	(2)	28	44	18	0
50–99	0	41	41	18	0
100–199	(2)	37	45	17	(2)
200–499	(2)	52	35	13	(2)
500 or more	(2)	23	58	17	2
B. By region: [1]					
New England	0	28	37	35	0
Middle Atlantic	(2)	21	65	14	(2)
East North Central	(2)	7	73	20	0
West North Central	(2)	2	63	32	2
South Atlantic	(2)	56	35	9	0
East South Central	0	40	47	13	0
West South Central	(2)	63	28	8	(2)
Mountain	0	(2)	65	35	(2)
Pacific	0	2	74	24	0
C. Total	1	30	51	17	1

[1] For meaning of size and region of school, see tables 1 and 2.
[2] Less than 1 percent.

In the schools in one region 63 percent of the students enrolled in intermediate algebra were 10th-grade pupils (see table 28–B), while in another region less than 1 percent were enrolled from that grade. The grade-placement of intermediate algebra does not seem to depend on the type or size of school as much as geographic location.

Required for Graduation

Intermediate algebra was required of all college-preparatory students by 18 percent of the schools in this study. The requirement was found more frequently in the regular and senior high school than in the combined junior-senior high school (see table 29–A).

Also the percentage of schools requiring the subject increased from 4 percent in the small school to 22 percent in the large school (see table 29–B).

Table 29.—Distribution, by type, size, and region, of the percent of schools that require intermediate algebra of college-preparatory pupils

Classification of school	Percent of schools	Classification of school	Percent of schools
A. By type: [1]		C. By region: [1]	
Regular (4-year) and senior high school	19	New England	35
Junior-senior high school	16	Middle Atlantic	32
B. By size: [1]		East North Central	7
10–49	4	West North Central	3
50–99	9	South Atlantic	25
100–199	13	East South Central	10
200–499	18	West South Central	21
500 or more	22	Mountain	7
		Pacific	7

[1] For meaning of size, type, and region of school, see tables, 1, 2, and 3.

The percent of schools that required intermediate algebra of college preparatory pupils also varied between geographic regions (see table 29–C). In one region only 3 percent of the schools required intermediate algebra for graduation while in another region 35 percent of the schools required the subject. One would assume that there would be a difference in schools concerning this requirement due to the philosophy of the school regarding electives, required subjects, entrance requirements of local colleges, and the needs of the students. However, one might not expect the differences to be as great as those indicated in table 29–C.

Time Allotted

Ninety-seven percent of the schools in this study that offered intermediate algebra indicated that the class met five periods each week. Three percent of the schools required four class meetings. The length of the period varied from less than 40 minutes to more than 70 minutes. Sixty-four percent of the schools reported a class period between 45 and 60 minutes in length.

The distribution of schools, by length of class period, is as follows: Less than 1 percent had class periods of 70 or more minutes; 22 percent, 60–69 minutes; 41 percent, 50–59 minutes; 23 percent, 45–49 minutes; 13 percent, 40–44 minutes; and less than 1 percent had periods less than 39 minutes.

These data show that many schools allot 50 percent more time to intermediate algebra than other schools offering the subject.

Size of Classes

Of the 13,000 pupils enrolled in intermediate algebra, 1 percent were in classes with enrollments of 41–50; 14 percent, 31–40 pupils; 44 percent, 21–30 pupils; 23 percent 11–20 pupils; 18 percent 1–10 pupils. Only 15 percent of the classes reported more than 30 pupils in enrollment. Two-thirds of the class enrollments were 11–30 pupils.

Field Trips

Less than 2 percent of the schools of this study that offered intermediate algebra indicated that field trips were used as a regular part of the instruction in the course. The use of field trips did not seem to be determined by the type of school (see table 30–A). In table 30–B and C the schools using field trips in intermediate algebra are distributed by size of school and geographic region. Since the number of schools reporting the use of this type of instruction is small, perhaps the only valid conclusion is that field trips in intermediate algebra are seldom used; and when they are, they do not seem to be confined to any one size of school or geographic region.

Table 30.—Distribution, by type, size, and region, of the schools which reported the use of field trips in intermediate algebra

Classification of school	Schools		Classification of school	Schools	
	Number	Percent		Number	Percent
A. By type: [1]			C. By region: [1]		
Regular (4-year) and senior high school	8	1.9	New England	1	2
Junior-senior high school	9	1.9	Middle Atlantic	2	2
B. By size: [1]			East North Central	4	2
10–49	0	0	West North Central	1	1
50–99	1	(2)	South Atlantic	4	4
100–199	4	2	East South Central	0	0
200–499	8	3	West South Central	4	3
500 or more	4	2	Mountain	1	2
			Pacific	0	0
			D. Total	17	1.9

[1] For meaning of size, region, and type of school, see tables 1, 2, and 3.
[2] Less than 1 percent.

Twelfth-Grade Mathematics

Offerings and Enrollments

On the basis of this study, it is estimated that more than 50,000 pupils were enrolled in solid geometry and plane trigonometry the first semester in 1953 (see table 31). Since solid geometry and trigonometry are usually half-year subjects—9 out of 10 pupils enrolled are in the half-year course—it is estimated that approximately 100,000 pupils study solid geometry and plane trigonometry each year in the public high schools. This number is equal to one-tenth of the number of pupils enrolled in the twelfth grade.

Table 31.—Number of pupils enrolled in twelfth-grade mathematics

Subject	Number of pupils		
	In study		Estimated in the United States
	1st semester, 1951–52	1st semester, 1952–53	1st semester, 1952–53
Trigonometry	2,277	2,154	53,500
Solid geometry	2,095	2,157	53,500

The schools in this study reported approximately the same number of pupils enrolled for the first semester of both 1951–52 and 1952–53. The ratio of the number of pupils enrolled in solid geometry to the number in the twelfth grade was only slightly more in the regular and senior high school than in the combined junior-senior high school (see table 32).

Table 32.—Enrollment in twelfth-grade mathematics, by type of school, first semesters, 1951–52 and 1952–53

Subject, by year	Enrollment, by type of school [1]			
	Regular (4-year) and senior high school		Junior-senior high school	
	Number	Percent [2]	Number	Percent [2]
1951–52:				
Trigonometry	1,738	6	539	4
Solid geometry	1,453	5	642	4
1952–53:				
Trigonometry	1,560	5	594	4
Solid geometry	1,483	5	724	5

[1] For meaning of type of school, see table 3.
[2] Ratio, expressed as percentage, of the number of students enrolled in the subject to the number enrolled in the twelfth grade in the indicated type of school.

In schools with enrollments below 200, the percentage of pupils enrolled in either of the two courses was less than for the larger schools. In fact, table 33–A indicates that there is little opportunity for a pupil to pursue the study of solid geometry in a small school. Schools with enrollments of 10–99 include 26 percent of the high schools and nearly 5 percent of the high-school pupils of this study, yet there were no students enrolled in solid geometry (see table 33–A).

There is a great difference in the percent of students enrolled in trigonometry and solid geometry from one region to another (see table 33–B). The enrollment in trigonometry in the first semester, 1952–53, was 15 percent of the 12th-grade pupils in one region and less than 1 percent in another region. The variation was nearly as great for the enrollments in solid geometry.

Table 33.—Distribution, expressed in percentage, of the ratio of the enrollments in trigonometry and solid geometry to the enrollment in the twelfth grade, first semester, 1952–53

Classification of school	Percent of enrollment, by subject	
	Trigonometry	Solid geometry
A. By size: [1]		
10–49	2	0
50–99	2	0
100–199	3	2
200–499	5	3
500 or more	5	6
B. By region: [1]		
New England	15	12
Middle Atlantic	9	6
East North Central	2	4
West North Central	2	4
South Atlantic	3	3
East South Central	3	4
West South Central	(2)	3
Mountain	6	(2)
Pacific	4	4

[1] For meaning of the size and region of school, see tables 1 and 2.
[2] The number of pupils enrolled in the subject was less than 1 percent of the enrollment in the 12th grade.

The schools in this study reported that approximately four times as many boys were enrolled in trigonometry and solid geometry as girls (see table 34). Since these subjects usually are taken by those pupils who expect to pursue further the study of mathematics or its related fields, one might expect the ratio of boys to girls enrolled to be even higher.

The enrollments for the first and second semesters in this study showed an increase in trigonometry and a decrease in solid geometry. No doubt this is due to the fact that trigonometry is more frequently offered in the spring when the weather will permit field work during the latter part of the course.

Table 34.—Ratio of boys to girls in twelfth-grade mathematics for first and second semesters, 1951–52, of the schools in this study

Subject	Ratio, by semester						
	1st semester		2d semester		Increase or decrease		
	Boys	Girls	Boys	Girls	Boys	Girls	Total
Trigonometry	78	22	75	25	+16	+36	+18
Solid geometry	80	20	80	20	—3	+3	—10

Grade Level of Pupils

Although in this study plane trigonometry and solid geometry are referred to as twelfth-grade subjects, the enrollments in these courses

are not confined to this grade. Fifteen to twenty percent of the pupils may be in the eleventh grade, while a small percent may be graduates. In fact, table 35 shows that of those pupils in this study enrolled in trigonometry 2 percent had graduated from high school. Also table 35 shows that in some geographic regions all the pupils enrolled in trigonometry in this study were in the twelfth grade and other regions reported half of the pupils so enrolled were in the eleventh grade. However, when all the schools of the study are considered, only 15 to 20 percent of the pupils in these courses are in the eleventh grade.

Table 35.—Distribution, by region of school, of the percent of pupils, by grade, enrolled in trigonometry and solid geometry

Region [1]	Subject	Percent of pupils, by grade		
		11	12	Post graduate
New England	Plane trigonometry	39	61	(2)
	Solid geometry	57	43	0
Middle Atlantic	Plane trigonometry	0	100	0
	Solid geometry	2	98	(2)
East North Central	Plane trigonometry	13	78	9
	Solid geometry	15	85	0
West North Central	Plane trigonometry	37	56	7
	Solid geometry	20	74	6
South Atlantic	Plane trigonometry	20	80	0
	Solid geometry	30	70	0
East South Central	Plane trigonometry	0	100	0
	Solid geometry	10	90	0
West South Central	Plane trigonometry	0	100	0
	Solid geometry	12	88	0
Mountain	Plane trigonometry	34	64	2
	Solid geometry	13	87	0
Pacific	Plane trigonometry	6	94	0
	Solid geometry	16	84	0
Total	Plane trigonometry	15	83	2
	Solid geometry	22	78	(2)

[1] For the meaning of region of school, see table 2.
[2] The number of pupils enrolled in the subject was less than 1 percent of the 12th-grade pupils in the indicated region.

Required for Graduation

Two high schools in this study reported that solid geometry or trigonometry were required of all students. Trigonometry was a graduation requirement for college-preparatory pupils of 3.5 percent of the schools and solid geometry was likewise required by 3.2 percent. This requirement was found slightly more frequently in the regular and senior high school than in the combined junior-senior high school (see table 36–A).

Schools in some of the geographic regions of the study reported that neither trigonometry nor solid geometry was required of college-preparatory students, while in other regions as high as 14 percent of the schools had such a requirement (see table 36–C). Perhaps this variation is due to the different entrance requirements of the colleges in these regions.

Table 36.—Distribution, by type, size, and region, of the percent of schools that require plane trigonometry and solid geometry of college-preparatory pupils

Classification of school	Percent of schools, by subject	
	Plane trigonometry	Solid geometry
A. By type: [1]		
Regular (4-year) and senior high school	4	4
Junior-senior high school	3	3
B. By size: [1]		
10–49	0	0
50–99	1	(2)
100–199	2	1
200–499	(2)	(2)
500 or more	9	8
C. By region: [1]		
New England	14	7
Middle Atlantic	10	8
East North Central	3	4
West North Central	2	1
South Atlantic	2	2
East South Central	0	0
West South Central	0	0
Mountain	2	0
Pacific	2	2
D. Total	3.5	3.2

[1] For meaning of size, region, and type of school, see tables 1, 2, and 3.
[2] Less than 1 percent.

Time Allotted

Normally classes in trigonometry and solid geometry meet 5 days each week for 18 weeks. Less than 10 percent of the schools reported that the courses were given a full year. Five percent of the schools reported that the courses met 4 days a week and with one exception the remainder of the schools reported that both trigonometry and solid geometry met 5 days each week (see table 37).

Table 37.—Number of periods per week allotted to twelfth-grade mathematics by the schools in this study

Number of periods	Percent of schools, by subject	
	Plane trigonometry	Solid geometry
3	(1)	0
4	5	5
5	95	95

[1] Less than 1 percent.

The pupil's total high-school experiences are usually measured in terms of credits. These credits or Carnegie units represent a certain number of clock hours spent in a class devoted to the subject. One might assume that two pupils who have half a unit each in trigonometry would have at least pursued the subject for the same length of time. However, table 38 indicates such an assumption does not agree with the data in this study. Twenty percent of the classes in trigonometry were 40–44 minutes in length and 16 percent were more than 60 minutes. Many pupils in both

trigonometry and solid geometry were spending 50 percent more class time on the subject than other pupils studying the subject.

Table 38.—Length of periods allotted to twelfth-grade mathematics by the schools in this study

Length of period (minutes)	Percent of schools, by subject	
	Plane trigonometry	Solid geometry
39 or less	[1]	[1]
40–44	19	16
45–49	21	19
50–59	43	47
60–69	16	17
70 or more	[1]	[1]

[1] Less than 1 percent.

Size of Classes

Classes in trigonometry and solid geometry usually have a small enrollment. Of the classes in these subjects reported in this study, one-third had an enrollment of 10 students or fewer (see table 39). Less than one-third of the classes had enrollments that exceeded 20.

Table 39.—Distribution, by size, of the percent of twelfth-grade mathematics classes reported in this study

Size of class	Percent of classes, by subject	
	Plane trigonometry	Solid geometry
1–10	34	32
11–20	38	38
21–30	25	22
31–40	3	8
41–50	[1]	[1]
51 or more	[1]	0

[1] Less than 1 percent.

Field Trips

In this study, 1 school out of 50 reported the use of field trips as a part of the instruction in 12th-grade mathematics. Field trips were used in trigonometry and solid geometry by 2.3 and 1.7 percent of the schools (see table 40). Although some schools and some regions did not use field trips in solid geometry, (table 41), large schools reported a greater use of field trips in solid geometry than in trigonometry. Table 41 shows that more of the regular and senior high schools of this study use field trips in 12th-grade mathematics than the schools in the combined junior-senior high schools.

Table 40.—Distribution, by region, of the number of schools which reported the use of field trips in twelfth-grade mathematics

Region	Number of schools using field trips, by subject		Number of schools in region
	Plane trigonometry	Solid geometry	
New England	1	0	43
Middle Atlantic	0	6	97
East North Central	4	1	153
West North Central	3	0	163
South Atlantic	3	2	107
East South Central	1	1	75
West South Central	3	4	126
Mountain	3	1	46
Pacific	3	0	47
Total	21	15	857
Percent	2.3	1.7	100

Table 41.—Distribution by type and size of the percent of schools which reported the use of field trips in twelfth-grade mathematics

Classification of school	Percent of schools, by subject	
	Plane trigonometry	Solid geometry
A. By type: [1]		
Regular (4-year) and senior high school	4	4
Junior-senior high school	2	(2)
B. By size: [1]		
10–49	0	0
50–99	1	0
100–199	1	0
200–499	3	1
500 or more	4	6

[1] For the meaning of type and size of school, see tables 1 and 2.
[2] Less than 1 percent.

Miscellaneous Mathematics Courses

Offerings and Enrollments

The schools in this study reported that more than 5,000 pupils were enrolled in five miscellaneous mathematics courses. These courses are not confined to any particular grade level. With the exception of one course, college algebra, the pupils enrolled were from all grade levels of the 4-year high school. Of these courses, high-school arithmetic had the largest enrollment. It exceeded the combined enrollments of the other four miscellaneous subjects; however, it was only 2 percent of the number of students enrolled in the last 4 years of high school (see table 42).

In 1949 the enrollment in mathematics review in the United States was approximately 12,000 and the estimate based on this study for 1952–53 is more than 40,000. The difference may be due partly to the ambiguity of the term; however, even under these conditions the data indicate a substantial increase in the number of pupils enrolled in the course.

Table 42.—Number of pupils enrolled in miscellaneous mathematics courses, first semester, 1952–53

Subject	Enrollment in study	Percent [1]	Estimated enrollment in the United States
High school arithmetic	5,183	2.0	128,900
College algebra	679	.2	16,800
Advanced general mathematics	1,394	.5	34,600
Mathematics review	1,685	.6	41,800
Consumer mathematics	1,472	.5	36,500

[1] Ratio, expressed in percentage, of the enrollment in the indicated subject to the total enrollment in grades 9–12.

Table 43 shows that mathematics review is more popular in the large high school than in the small school. The opposite is true in the case of consumer mathematics. In the New England region (table 43–B), 4 percent of the students enrolled in the last 4 years of high school are also enrolled in mathematics review; however, in the Mountain region no enrollments were reported in this subject. As shown in table 43, the percent of enrollments varies from one region to another and in all cases the percent of students of the last 4 years of high school enrolled in these subjects is small.

Table 43.—Distribution, expressed in percentage, of the ratio of the enrollments in the indicated miscellaneous mathematics courses to the enrollment in the 12th-grade, first semester, 1952–53

Classification of school	Ratio of enrollments, by subject				
	High school arithmetic	College algebra	Advanced general mathematics	Mathematics review	Consumer mathematics
A. By size: [1]					
10–49	0.6	0.6	0.6	0	1.0
50–99	1.9	.1	.4	.5	.1
100–199	1.6	.2	.4	.4	.5
200–499	2.6	.2	.7	.5	.7
500 or more	2	.3	.6	.8	.6
B. By region: [1]					
New England	3	(2)	(2)	4	(2)
Middle Atlantic	1	(2)	1	(2)	2
East North Central	2	(2)	(2)	1	(2)
West North Central	1	(2)	(2)	1	1
South Atlantic	2	(2)	1	(2)	
East South Central	6	(2)	(2)	1	
West South Central	2	(2)	1	(2)	
Mountain	3	(2)	(2)	0	
Pacific	3	(2)	(2)	(2)	(2)

[1] For meaning of size and region of school, see tables 2 and 3.
[2] Less than 1 percent.

Grade Level of Pupils

Table 44 shows the grade level of the students enrolled in the miscellaneous mathematics courses. In most schools high-school arithmetic was composed of ninth-and tenth-grade students, but in a few schools it was composed of mostly eleventh-and twelfth-grade pupils; and in still other schools all grade levels were represented. Thus in some cases

the review was preparatory to high school and in other cases it was preparatory to college. The subject which has the largest percent of postgraduates is college algebra.

Table 44.—Distribution, by grade, of the percent of pupils enrolled in the miscellaneous mathematics courses

Subject	Percent of pupils enrolled, by grade				
	9	10	11	12	Postgraduate
High school arithmetic	50	28	8	14	0
College algebra	0	8	24	62	6
General mathematics	0	34	24	42	(1)
Mathematics review	19	14	14	50	3
Consumer mathematics	3	28	23	46	0

[1] Less than 1 percent.

Required for Graduation

Three percent of the schools of this study offering high-school arithmetic required it of all students for graduation. A few schools required other miscellaneous courses. For example, general mathematics was required by 1 percent of the schools; consumer mathematics, 0.7 percent; and mathematics review, 0.4 percent.

Several schools commented that they required arithmetic or mathematics review if the student could not pass a proficiency test. The test was given in some schools at the beginning of the 9th grade and in others in the 11th grade.

Time Allotted

It will be observed from table 45 that more than 90 percent of the schools in the study offering the miscellaneous mathematics courses met them 5 days each week. Only two schools reported mathematics classes which met less than 4 days a week. The variation in number of periods of the meetings of the classes was much less than the difference in length of class period. For example, in the consumer mathematics classes, 90 percent met 5 days a week, but 40 percent of the classes were either less than 45 or greater than 59 minutes in length (see table 46).

Table 45.—Number of periods per week allotted to the miscellaneous mathematics courses by the schools in this study

Number of periods	Percent of schools, by course			
	High school arithmetic	Advanced general mathematics	Mathematics review	Consumer mathematics
3	(1)	0	0	(1)
4	3	6	7	10
5	97	94	93	90

[1] Less than 1 percent.

Table 46.—Length of periods allotted to the miscellaneous mathematics courses by the schools in this study

Length of period (minutes)	Percent of schools, by course			
	High school arithmetic	Advanced general mathematics	Mathematics review	Consumer mathematics
39 or less	0	0	0	0
40–44	15	23	14	20
45–49	23	18	28	20
50–59	34	41	33	40
60–69	28	18	25	20
70 or more	(1)	0	0	(1)

[1] Less than 1 percent.

Size of Classes

Table 47 shows the percentage of the classes reported in this study that had the indicated enrollments. It will be observed that 4 percent of the classes in high-school arithmetic and consumer mathematics were in excess of 41 pupils. In high-school arithmetic, 78 percent of the classes contained more than 20 pupils, while in college algebra only 35 percent were of that size. Since high-school arithmetic and mathematics review are review type of courses, one might raise such questions as: Should there be more diagnostic and individual instruction in these courses than other mathematics courses? If individual instruction is required in this type of class, should the enrollments be smaller? Of course, if these courses are only drill periods on one skill, group drill may be the best method. However, it would seem unlikely that all students in a class would need drill on the same single skill. Some leaders in mathematics education contend that pupils have had drill without understanding in arithmetic for 8 or more years without desirable results and the better solution is individual or small group instruction with emphasis on the meaning of the concepts and operations. In any case, large classes seldom lend themselves effectively to remedial instruction.

Table 47.—Distribution, by size, of the percent of miscellaneous mathematics courses in this study

Size of class	Percent of classes, by course				
	High school arithmetic	College algebra	Advanced general mathematics	Mathematics review	Consumer mathematics
1–10	6	35	14	4	8
11–20	16	30	35	39	41
21–30	58	29	27	35	36
31–40	16	5	22	18	15
41–50	4	1	2	4	0
51 or more	0	0	0	0	0

Field Trips

Few schools in this study use field trips as a part of the instruction in the miscellaneous mathematics courses. In fact, no school reported the

use of field trips in mathematics review. The schools in this study used field trips most frequently in teaching consumer mathematics. However, in this subject only 1.4 percent of the schools reported that planned field trips were a regular part of instruction (see table 48).

Table 48.—Number and percent of schools which reported the use of field trips in the miscellaneous mathematics courses

Subject	Number	Percent
High school arithmetic	4	0.4
College algebra	2	.2
General mathematics	6	.7
Mathematics review	0	0
Consumer mathematics	12	1.4

Mathematics—Grades 7–12

Offerings and Enrollments

In this study, 857 schools reported an enrollment of 326,640 pupils. The total enrollment in all courses in mathematics was 201,902. An estimate, based on the data from this survey, of the total enrollment in all mathematics courses in the public high schools in the United States is 4,915,000.

There were 80,373 pupils in the seventh and eighth grades where mathematics is a required subject. Courses offered in the last 4 years of high school were elementary algebra, general mathematics, high-school arithmetic, plane geometry, intermediate algebra, college algebra, plane trigonometry, solid geometry, advanced general mathematics, mathematics review, and consumer mathematics. The enrollment in these courses for the first semester 1952–53 was 51 percent of the total enrollment of the last 4 years of high school in the schools. During a comparable period in 1933–34 the enrollment in the mathematics courses offered in the last 4 years of high school was 59 percent of the number of students enrolled in grades 9–12.

There has been little change in the percent of ninth-grade pupils enrolled in mathematics; the decrease in enrollments has been in the upper years of high school. For example, the enrollment the first semester, 1952–53, in plane geometry, intermediate algebra, college algebra, plane trigonometry, solid geometry, advanced general mathematics, mathematics review, and consumer mathematics, which are normally taken by pupils in grades 10–12, was 27 percent of the students enrolled in these grades. In 1934 similar subjects showed an enrollment equal to 43 percent of the pupils in these grades.

Table 49 shows the enrollments over the years of courses in mathematics for which data are available. The enrollments in general mathematics, mathematics review, and arithmetic have increased and tradi-

tional college-preparatory mathematics has not kept pace with the increase in the growth of the high schools.

The number of pupils enrolled in high-school arithmetic in the first semester, 1952–53, in the schools in this study was larger than the combined enrollments in college algebra, plane trigonometry, and solid geometry. In fact, 32 percent of the pupils enrolled in mathematics in grades 9–12 were in the general education type of course, such as, consumer mathematics, general mathematics, and high-school arithmetic.

The schools in this study reported a decrease in enrollment between the first and second semester of 1951–52 of 13 percent. The data in this survey did not indicate whether these pupils dropped out of school or enrolled in another subject.

The enrollments in mathematics necessary for the development of technical personnel showed little, if any, increase. The improvement of our standard of living and national defense depends upon an increased supply of technical personnel. A knowledge of mathematics is a primary prerequisite to success in many technical areas. If the national supply of engineers, scientists, and technicians is to be increased, it will be necessary for more boys and girls in high school to have experiences in mathematics.

Table 49.—Number and percent of pupils enrolled in certain courses in mathematics in the last 4 years of public secondary day schools, 1889–90 to 1952–53

Year	Algebra		General mathematics		Geometry		Trigonometry	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1890 [1]	92,150	45.4	----------	----------	43,294	21.3	----------	----------
1900	292,287	56.3	----------	----------	142,235	27.4	9,915	1.9
1910	420,207	56.9	----------	----------	228,170	30.9	13,812	1.9
1915	569,215	48.8	----------	----------	309,383	26.5	17,220	1.5
1922	865,515	40.2	266,918	12.4	488,825	22.7	32,980	1.5
1928	1,020,323	35.2	228,231	7.9	573,668	19.8	36,855	1.3
1934	1,367,210	30.4	333,348	7.4	767,171	17.1	59,850	1.3
1949	1,448,966	26.8	704,742	13.1	693,280	12.8	108,551	2.0
1953 [2]	1,475,900	24.6	901,300	15.0	659,300	11.6	104,000	1.7

[1] Biennial Survey of Education in the United States, 1948–50. Chapter 5, Washington, United States Government Printing Office, 1951. p. 107. (Federal Security Agency, Office of Education).
[2] Estimate based on this study.

Grade Level of Pupils

Seventh-and eighth-grade pupils in this survey were enrolled in arithmetic or general mathematics. For the first semester, 1952–53, there were four times as many pupils in arithmetic as in general mathematics.

The ninth-grade pupils, although usually enrolled in elementary algebra or general mathematics, were found in all classes except advanced algebra, plane trigonometry, and solid geometry. The majority of 10th-grade pupils enrolled in mathematics were in plane geometry, but they were enrolled in all other subjects except trigonometry and solid geometry. The 11th-and 12th-grade pupils were not confined to intermediate

algebra, trigonometry, and solid geometry. Pupils of these grade levels were found in all subjects except advanced general mathematics in which no 12th-grade pupils were enrolled. The pupils enrolled in mathematics in the last 4 years of the schools in this study are in the following grade levels: 50 percent in the 9th grade, 27 percent in the 10th grade, 14 percent in the 11th grade, and 9 percent in the 12th grade. The national need for technical personnel should cause an increase in the number of 11th-and 12th-grade pupils studying mathematics.

Required for Graduation

Ninety-two percent of the schools in this study required at least 1 year of mathematics of all students during the last 4 years of high school (see table 50). Sixty-five percent of the schools specify either algebra or general mathematics.

If the students were preparing to enter college, nearly three-fourths of the schools required at least 2 years of mathematics. More than half of the schools state that algebra is one of the required mathematics subjects and 40 percent of the schools also include geometry.

It should be noted that many schools indicated that in addition to requirements for graduation attempts were made to guide pupils into mathematics courses according to their need.

Table 50.—Percent of schools which require various semesters in mathematics

Type of student	Percent of schools, by number of semesters in mathematics				
	0	2	4	6	8
All students	8	65	24	3	(1)
College-preparatory	4	26	45	25	(1)

[1] Less than 1 percent of schools in the study had the indicated graduation requirement.

Time Allotted

Ninety-six percent of the schools in this study reported that the classes in mathematics met five periods each week. The schools that reported mathematics classes meeting fewer than five times a week were fairly evenly distributed among the different sizes and types of schools. These schools were confined to the New England and Middle Atlantic geographic regions. However, table 51 indicates that fewer than 4 percent of the schools deviated from the five periods per week pattern.

The length of period of the classes in mathematics varied from less than 30 minutes to more than 70 minutes. Twenty percent of the schools reported that the class periods were 60 or more minutes. Other schools, 14 percent of those in the study, reported class periods of less than 45 minutes; 25 percent, 45–49 minutes; and 40 percent, 50–59 minutes. Many schools reported that some of the time in the longer class periods

Table 51.—Number of periods per week allotted to mathematics by schools in this study

Periods per week	Classes	
	Number	Percent
3	18	0.3
4	139	3.3
5	3,985	96.3

was used for supervised study. In any case, the data show that many pupils receive 50 percent more time in instruction in courses in mathematics than other pupils enrolled in the same course (see table 63).

The regular and senior high school had a greater variation in length of class period than the other two types of schools (see table 52–A). For example, in the junior high school 82 percent of the classes were 45 to 59 minutes compared with 69 percent in the regular and senior high school.

There was a tendency among the larger schools to have a class period of approximately 55 minutes, while the shorter period was more popular in the smaller school (see table 52–B).

The greatest variation in length of class period was between schools in different geographic regions (see table 52–C). In one region 53 percent of the schools reported classes were 40 to 44 minutes in length, while in another region 43 percent of the schools had class periods of an hour or more. It would seem from this study that the amount of time a pupil receives instruction in mathematics depends largely upon the geographic location of the high school which he attends.

Table 52.—Percent of the schools in this study with class periods of the indicated length

Classification of school	Percent of schools, by length of period					
	39 or less	40–44	45–49	50–59	60–69	70 or more
A. By type: [1]						
Junior high school	1	7	33	49	10	0
Regular (4-year) and senior high school	(2)	18	21	38	23	(2)
Junior-senior high school	1	13	26	40	20	(2)
B. By size: [1]						
10–49	4	9	44	17	26	0
50–99	2	17	30	28	23	0
100–199	2	14	28	32	24	0
200–499	0	14	24	43	18	1
500 or more	0	13	17	52	18	0
C. By region: [1]						
New England	0	33	21	17	9	0
Middle Atlantic	0	25	22	32	8	3
East North Central	(2)	18	23	40	8	0
West North Central	2	17	15	45	21	0
South Atlantic	0	0	15	59	23	0
East South Central	2	6	21	18	45	0
West South Central	2	3	26	29	40	0
Mountain	1	(2)	30	44	17	0
Pacific	0	3	6	87	4	0

[1] For meaning of size, region, and type of school, see tables 1, 2, and 3.
[2] Less than 1 percent.

Size of Classes

Seventy-four percent of the classes reported in this study had an enrollment of 21 to 40 pupils. Three percent of the classes contained more than 41 pupils. (see table 53). Four classes were reported with an enrollment greater than 51 pupils.

Table 53.—Distribution, by size, of all mathematics classes reported in this study

Size	Classes	
	Number	Percent
1–10	631	8
11–20	1,291	15
21–30	3,384	40
31–40	2,825	34
41–50	229	3
51 or more	4	(1)

[1] Less than 1 percent.

As it would be expected, the large classes were, in general, in the larger schools; however, the small classes were not confined entirely to the small high schools (see table 54–A). The large classes were more frequent in the junior high school than in the other types (see table 54–B). In fact, 60 percent of the mathematics classes of the junior high school contained more than 30 pupils compared with 30 percent for the other types of schools. Also the mathematics classes for the seventh and eighth grades were larger than those for the ninth grade. The classes in general

Table 54.—Distribution of the mathematics classes in this study, by size within type, size, and region of school

Classification of school	Percent of enrollment, by size of class					
	1–10	11–20	21–30	31–40	41–50	51 or more
A. By type: [1]						
Junior high school	1	3	35	57	4	(2)
Regular (4-year) and senior high school	9	19	44	27	1	0
Junior-senior high school	9	19	41	28	3	0
B. By size: [1]						
10–49	54	40	5	1	0	0
50–99	4	42	28	6	(2)	0
100–199	16	30	33	13	3	(2)
200–499	8	17	45	26	4	0
500 or more	1	7	42	47	3	(2)
C. By region: [1]						
New England	4	21	53	20	2	0
Middle Atlantic	2	13	36	50	4	(2)
East North Central	9	18	47	24	1	0
West North Central	14	21	40	24	1	0
South Atlantic	4	11	37	43	5	0
East South Central	5	16	53	20	7	0
West South Central	7	21	38	33	2	0
Mountain	10	13	42	31	4	0
Pacific	4	6	38	48	2	0

[1] For meaning of size, region, and type of school, see tables 1, 2, and 3.
[2] Less than 1 percent.

mathematics in seventh and eighth grades were usually larger than those in arithmetic (see table 55).

The variation in the size of classes between schools in different geographic regions is shown in table 54–C. In one region 50 percent of the classes had enrollments above 30 and another region only 20 percent.

Table 55.—Distribution, by size, of mathematics classes in grades 7–9 reported in this study

Subject	Percent of enrollment, by size of class					
	1–10	11–20	21–30	31–40	41–50	51 or more
Arithmetic 7	1.6	6.7	26.2	49.6	5.7	(1)
Mathematics 7	(1)	2.6	38.6	54.1	3.9	0
Arithmetic 8	1.9	7.7	41.0	44.8	4.3	0
Mathematics 8	1.4	1.4	42.0	52.8	2.1	0
Algebra	4.0	12.0	46.0	36.0	2.0	(1)
General mathematics	3.0	15.0	42.0	37.0	3.0	0

[1] Less than 1 percent.

Part-time and Full-time Teachers

The schools in this study reported 2,667 teachers of mathematics of which 66 percent were men. Of the total number of full-time teachers, 1,488 were devoting only part time to instruction in mathematics. The men slightly outnumbered the women both as full-time and part-time teachers of mathematics. Data in this study indicate that in the first semester, 1952–53, in the secondary day schools in the United States there were approximately 65,000 persons teaching mathematics of which 29,000 were devoting full time to the subject (see table 56).

Table 57 shows that nearly half of the schools in this study reported two or more teachers who were devoting part time to teaching mathematics. This tendency to assign teachers to more than one subject area is greater in the combined junior-senior high school than in the other types of high schools. Also it was more frequent in the large school than the smaller one (see table 57–B).

Eighty-five percent of the schools in one region reported that each school had two or more teachers who were devoting part time to the teaching of mathematics (see table 57–C). In fact, 30 schools in this study (nearly 4 percent) reported five or more teachers devoting part time to the teaching of mathematics. A study of table 57 might raise the question of whether it is better to assign the teaching of mathematics to several members of the high-school staff or to a few members of the staff who have specialized in this area. Should the teaching of mathematics be a full-time job for a specialist or collateral duty for any teacher? In the schools of this study, less than half of the teachers instructing in mathematics were devoting full time to the subject.

Table 56.—Number of teachers of mathematics, first semester, 1952–53

Teachers—	Number of mathematics teachers—	
	In sample	In United States [1]
Devoting full time to mathematics	1,179	29,000
Devoting part time to mathematics	1,488	36,000
Total	2,667	65,000

[1] Estimate based on this study.

Table 57.—Percent of schools reporting two or more regular teachers who devote part time to mathematics

Classification of school	Percent of schools	Classification of school	Percent of schools
A. By type: [1]		C. By region: [1]	
Junior high school	51	New England	51
Regular (4-year) and senior high school	40	Middle Atlantic	54
Junior-senior high school	54	East North Central	54
B. By size: [1]		West North Central	57
10–49	37	South Atlantic	48
50–99	40	East South Central	48
100–199	40	West South Central	57
200–499	54	Mountain	57
500 or more	61	Pacific	65
		Total	48

[1] For meaning of size, region, and type of school, see tables 1, 2, and 3.

Field Trips

In no subject did more than 7 percent of the schools report that field trips were a regular part of the course. However, in all mathematics courses except mathematics review some schools reported the use of planned field trips. Schools that employed field trips as a part of the instruction in one course tended to employ it in other courses.

Although used in only a few schools, properly planned field trips as a means of motivating and enriching the teaching of mathematics may be very desirable. The pupil's direct experience in seeing the applications and uses of mathematics in his community should make his classroom work more interesting and meaningful.

Summary

Offerings and Enrollments

This study reports data for the school year 1951–52 and the first semester of 1952–53. This information is based upon replies received from 357 randomly selected public high schools.

Technically trained men are needed to increase our standard of living in times of peace or safeguard our republic in times of war. A knowledge of mathematics is the language of these scientific workers. If our supply of specialized personnel is to increase, the enrollments in mathematics

of capable pupils must increase. Enrollments in mathematics for general education have increased, but the enrollments in the college-preparatory mathematics has not kept pace with the growth of the high schools.

Of the students enrolled in ninth-grade mathematics approximately 40 percent were in general mathematics. An estimate based on this study indicates that 1 million pupils were enrolled in elementary algebra and three-fourths million in ninth-grade general mathematics in 1952–53. This study indicates that half a million pupils in the United States are enrolled in plane geometry. The schools in this study had enrollments in geometry equal to 34 percent of the enrollment in the 10th grade. The number of pupils enrolled in intermediate algebra was equal to approximately 23 percent of the pupils in the 11th grade. The number of pupils enrolled in the 12th-grade mathematics was equal to one-tenth of the number of pupils enrolled in the 12th grade. The enrollments in college algebra were the least of any of the subjects investigated. Data from this study indicate that the enrollment in the United States in college algebra in 1953 is approximately 16,800. This number is about 0.2 percent of the pupils in the last 4 years of high school.

If our nation is to continue its scientific expansion, many young people must have mathematical experiences in high school that will give the the maximum development of their abilities.

Holding Power of Mathematics

For instruction to be most effective, the pupil must experience success and understand the importance of his tasks. The schools in this study reported a decrease in enrollments between the first and second semesters, 1951–52, for most schools in mathematics. The enrollment in algebra decreased 14 percent for boys and 9 percent for girls. In geometry the decrease was 18 percent for boys and 11 percent for girls. The decrease in enrollment in intermediate algebra was 32 percent for boys and 26 percent for girls. This data indicate that it might be desirable to restudy the factors that affect the holding power of pupils in mathematics education.

Grade Level of Pupils

Elementary algebra is normally a ninth-grade subject. However, in some geographic regions a third of the enrollment in the subject was 10th-grade pupils. Likewise, in one region the enrollment in geometry—a 10th-grade subject—is composed of 50 percent 11th-grade students. All courses in mathematics in the last 4 years of public high school had pupils enrolled in them from at least 3-grade levels. In this study, the pupils enrolled in mathematics in the last 4 years of high school were in the following grade levels: 50 percent in the ninth grade; 27 percent in the 10th grade; 14 percent in the 11th grade; and 9 percent in the 12th grade. Should not the national need for personnel with a background in

mathematics cause an increase in the number of 11th-and 12th-grade pupils studying mathematics?

Mathematics Required for Graduation

At least 1 year of mathematics was required of all pupils by 92 percent of the schools in this study. Sixty-five percent of the schools reported that either algebra or general mathematics would satisfy the requirement. For the college-preparatory pupil, nearly three-fourths of the schools required at least 2 years of mathematics. Forty percent of the schools included geometry in the requirement. The requirement of geometry for college-preparatory pupils was nearly twice as frequent among large schools as small ones.

Time Allotted

The number of class periods per week and the number of weeks the course in mathematics meets varies little among schools. Most mathematics classes meet for 36 weeks and 5 days each week. There was a great variation in length of period allotted to the study of mathematics. The length of class periods ranged from 30 to 70 minutes. The variation was most marked among schools in different geographic regions. For example, in one region 58 percent of the schools had 40 to 44 minutes in the class periods in seventh-grade arithmetic, while another region had no class periods of that length, but it did report that 82 percent of its schools had classes of 50 to 59 minutes in length. Perhaps in the longer class period, the time for supervised study is increased. In any case, this study indicates that many pupils receive 50 percent more time in instruction in courses in mathematics than other pupils enrolled in the same courses.

Size of Classes

Three-fourths of the classes reported in this study had enrollments between 21 and 40. Three percent of the classes contained more than 41 pupils. The classes were largest in the junior high school. Fifty-seven percent of the classes in the junior high school had enrollments between 31 and 40, while only 27 percent of the regular 4-year and senior high school were of that size. The classes in remedial mathematics, such as, mathematics review and high-school arithmetic, were among those with the largest enrollments.

Part-Time and Full-Time Teachers

Nearly half of the schools in this study reported two or more teachers who were devoting part time to teaching mathematics. This tendency to assign teachers to more than one subject area is greater in larger schools than in the smaller ones, and greater in the combined junior-

senior high school than in the other types of high school. In this study, less than half of the teachers instructing in mathematics were devoting full time to the subject. This data might suggest the following question: Is teaching mathematics a full-time job for a specialist or collateral duty for any teacher?

Field Trips

Planned field trips have been suggested as a means of enriching the instruction in mathematics. The field trip usually consists of an educational experience that requires the pupils to leave the classroom. In this way, the teacher can point out the relationships of the mathematics of the classroom to the mathematics of the community. The percent of junior high schools using field trips was three times as great as for the combined junior-senior high schools. Field trips are used less in grades 9 to 12 than in grades 7 to 8. Only 32 schools of 857 schools in this study reported the use of field trips in algebra and 46 in general mathematics. In no subject did more than 7 percent of the schools report that field trips are a regular part of the course.

As the demands of our society cause the need for specialized personnel to continue increasing, the responsibility of the teachers of mathematics become more apparent. The need for pupils trained in the mathematics—a language of modern civilization—stands out in bold relief. Enrollments in mathematics are not meeting the demands. However, many groups of teachers are restudying the mathematics curriculum, reevaluating their teaching procedures in an attempt to stimulate more effective learning.

Table 58.—Enrollment, by subject, in schools whose data were used in this study, by type of school

Subject	1st semester, 1951-52			2d semester, 1951-52			1st semester, 1952-53		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
A. Junior high school:									
Arithmetic 7th grade	7,099	6,508	13,982	5,726	5,669	12,439	7,207	6,873	15,064
General mathematics 7th grade	1,952	1,764	3,891	1,978	1,740	3,893	2,685	2,920	5,545
Arithmetic 8th grade	6,596	6,526	13,996	5,420	5,424	11,586	7,593	7,339	15,851
General mathematics 8th grade	1,602	1,587	3,345	1,469	1,896	3,551	2,092	2,042	4,134
Elementary algebra	2,630	2,558	5,081	2,131	2,155	5,122	3,929	3,889	8,907
General mathematics	2,084	2,205	5,086	1,811	1,769	4,297	3,978	3,758	7,963
High school arithmetic	105	136	241	83	103	186	104	67	171
Plane geometry	49	23	72	14	10	24	16	19	35
Intermediate algebra	123	93	216	78	64	142	31	22	53
Advanced general mathematics	21	12	33	13	14	27	13	14	27
Mathematics review	0	0	0	0	0	0	30	27	57
Consumer mathematics	0	0	206	0	0	206	0	0	0

Table 58.—Enrollment, by subject, in schools whose data were used in this study, by type of school—Continued

Subject	1st semester, 1951-52			2d semester, 1951-52			1st semester, 1952-53		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
B. Regular (4-year) and senior:									
Arithmetic 8th grade	32	36	68	31	25	56	20	27	47
General mathematics 8th grade	63	67	130	50	53	103	53	51	104
Elementary algebra	9,417	8,783	20,785	8,126	8,084	18,381	11,171	9,464	22,743
General mathematics	5,831	6,914	12,297	5,063	4,176	10,729	6,877	5,921	14,090
High school arithmetic	1,583	1,379	3,385	1,218	1,276	2,972	1,699	1,540	3,450
Plane geometry	7,021	5,558	14,051	5,553	4,876	11,991	8,182	6,149	15,382
Intermediate algebra	4,581	2,989	8,378	2,944	2,089	5,720	5,344	3,217	8,999
College algebra	218	100	420	296	105	448	287	128	470
Plane trigonometry	1,250	296	1,738	1,370	463	1,984	1,234	275	1,560
Solid geometry	873	162	1,453	922	210	1,416	1,117	259	1,433
Advanced general mathematics	381	220	561	209	306	550	360	367	727
Mathematics review	264	306	906	310	346	1,080	562	613	1,199
Consumer mathematics	663	376	1,091	646	355	1,001	659	289	977
C. Junior-senior and undivided:									
Arithmetic 7th grade	6,267	6,067	13,123	5,673	5,430	11,596	6,691	6,826	13,683
General mathematics 7th grade	1,000	982	1,982	848	835	1,752	1,153	996	2,149
Arithmetic 8th grade	7,079	6,609	14,498	5,995	5,934	12,678	7,560	7,417	15,572
General mathematics 8th grade	1,724	1,846	3,570	1,497	1,547	3,097	1,799	1,763	3,562
Elementary algebra	6,114	5,742	13,216	5,341	5,292	11,442	6,845	6,793	14,015
General mathematics	3,280	3,248	7,231	2,951	2,741	6,326	4,099	3,856	8,228
High school arithmetic	601	565	1,410	556	574	1,365	687	647	1,562
Plane geometry	3,320	2,732	6,602	2,926	2,509	5,873	3,889	2,873	7,110
Intermediate algebra	2,020	1,468	3,865	1,584	1,192	2,942	2,207	1,569	3,963
College algebra	138	86	256	138	66	236	123	86	209
Plane trigonometry	342	147	539	479	150	713	430	136	594
Solid geometry	383	136	642	292	97	456	514	127	724
Advanced general mathematics	323	286	660	241	220	468	338	287	640
Mathematics review	99	82	181	82	71	169	239	171	430
Consumer mathematics	174	255	547	151	185	390	217	278	495

Table 59.—Enrollment, by subject, of schools whose data were used in this study, by size of school

Subject	1st semester, 1951-52			2d semester, 1951-52			1st semester, 1952-53		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
ENROLLMENT 10 TO 49									
Arithmetic 7th grade	96	113	209	97	112	209	122	120	253
General mathematics 7th grade	13	11	24	6	8	14	17	17	34
Arithmetic 8th grade	121	101	246	115	98	237	76	81	166
General mathematics 8th grade	25	35	60	9	11	20	7	11	18
Elementary algebra	206	183	389	200	175	375	202	197	409
General mathematics	164	167	331	148	156	304	142	100	242
High school arithmetic	32	37	69	19	26	45	9	4	13
Plane geometry	111	95	205	116	88	204	117	76	198
Intermediate algebra	41	31	72	20	11	31	25	18	43
College algebra	0	0	0	0	0	0	10	5	15
Plane trigonometry	3	0	3	1	0	1	6	0	6
Solid geometry	0	0	0	0	0	0	0	0	0
Advanced general mathematics	5	1	6	11	5	16	9	6	15
Mathematics review	0	0	0	0	0	0	0	0	0
Consumer mathematics	30	29	59	29	27	56	25	13	38

Table 59.—Enrollment, by subject, of schools whose data were used in this study, by size of school—Continued

Subject	1st semester, 1951-52			2d semester, 1951-52			1st semester, 1952-53		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
ENROLLMENT 50 TO 99									
Arithmetic 7th grade	387	424	831	323	336	679	389	398	787
General mathematics 7th grade	41	44	85	49	53	101	65	60	125
Arithmetic 8th grade	515	493	1,008	399	410	829	426	442	868
General mathematics 8th grade	63	60	123	44	36	80	74	49	123
Elementary algebra	975	923	1,984	806	789	1,636	943	890	1,865
General mathematics	572	682	1,191	450	439	889	551	593	1,149
High school arithmetic	57	71	128	62	82	144	78	82	160
Plane geometry	435	336	771	307	260	567	420	353	805
Intermediate algebra	183	160	345	119	96	250	226	161	387
College algebra	6	5	11	6	5	11	4	7	11
Plane trigonometry	14	12	26	25	22	47	23	19	42
Solid geometry	8	6	14	7	1	8	2	4	6
Advanced general mathematics	30	26	56	31	26	57	23	13	36
Mathematics review	0	0	0	0	0	0	21	21	42
Consumer mathematics	18	16	85	9	13	43	23	16	39
ENROLLMENT 100 TO 199									
Arithmetic 7th grade	1,534	1,501	3,161	1,311	1,384	2,811	1,531	1,515	3,080
General mathematics 7th grade	69	52	121	68	52	120	70	54	124
Arithmetic 8th grade	1,507	1,522	3,157	1,356	1,389	3,322	1,547	1,692	3,244
General mathematics 8th grade	210	199	409	197	176	373	176	197	373
Elementary algebra	2,047	2,063	4,220	1,875	1,879	3,890	2,175	2,264	4,544
General mathematics	1,312	1,342	2,752	1,136	1,151	2,407	1,365	1,381	2,810
High school arithmetic	132	155	312	124	126	275	188	151	339
Plane geometry	957	702	1,738	811	613	1,489	939	767	1,716
Intermediate algebra	590	455	1,083	497	392	917	601	499	1,211
College algebra	17	9	26	18	9	27	21	11	32
Plane trigonometry	13	8	21	49	14	63	93	28	121
Solid geometry	34	8	45	37	15	52	60	14	74
Advanced general mathematics	87	71	168	36	67	103	42	48	90
Mathematics review	10	15	41	0	0	16	50	37	87
Consumer mathematics	69	49	118	66	38	104	54	50	104
ENROLLMENT 200–499									
Arithmetic 7th grade	3,318	3,229	6,782	2,805	2,796	5,816	3,639	3,368	7,340
General mathematics 7th grade	705	722	1,427	607	609	1,285	890	1,280	2,170
Arithmetic 8th grade	3,559	3,494	7,486	3,007	2,988	6,289	3,841	3,745	7,925
General mathematics 8th grade	817	878	1,695	805	1,330	2,189	964	902	1,866
Elementary algebra	4,447	4,519	9,543	4,084	4,063	8,498	5,609	5,471	11,685
General mathematics	2,409	2,318	5,263	2,309	2,019	4,764	3,085	3,170	6,661
High school arithmetic	592	590	1,272	471	540	1,161	566	615	1,373
Plane geometry	2,049	1,698	3,915	1,862	1,632	3,637	2,454	1,766	4,456
Intermediate algebra	1,512	1,113	2,714	1,185	943	2,154	1,534	1,248	2,850
College algebra	86	41	186	81	31	112	39	28	69
Plane trigonometry	353	86	465	477	134	613	433	91	588
Solid geometry	173	69	242	258	60	318	259	76	335
Advanced general mathematics	139	108	247	114	102	216	157	181	338
Mathematics review	96	99	195	112	115	227	131	186	273
Consumer mathematics	146	142	321	131	131	297	181	173	354
ENROLLMENT 500 OR MORE									
Arithmetic 7th grade	9,041	7,208	16,102	6,663	6,471	14,530	[illegible]	7,790	17,277
General mathematics 7th grade	2,124	1,917	4,216	2,096	1,854	4,125	[illegible]	[illegible]	[illegible]
Arithmetic 8th grade	9,005	7,561	16,744	6,589	6,484	14,133	[illegible]	[illegible]	[illegible]
General mathematics 8th grade	2,274	2,203	4,758	1,960	1,943	4,089	[illegible]	[illegible]	[illegible]
Elementary algebra	10,486	9,385	22,786	8,713	8,626	20,546	[illegible]	[illegible]	[illegible]
General mathematics	6,738	6,864	15,077	5,842	5,627	12,977	[illegible]	[illegible]	[illegible]
High school arithmetic	1,477	1,227	3,256	1,161	1,179	2,909	[illegible]	[illegible]	[illegible]
Plane geometry	6,833	5,492	14,098	5,897	4,882	11,991	[illegible]	[illegible]	[illegible]
Intermediate algebra	4,998	2,761	8,246	2,766	1,982	5,452	[illegible]	[illegible]	[illegible]
College algebra	247	131	403	329	126	484	[illegible]	[illegible]	[illegible]
Plane trigonometry	1,309	337	1,759	1,297	433	1,973	[illegible]	[illegible]	[illegible]
Solid geometry	1,040	215	1,794	913	241	1,486	[illegible]	[illegible]	[illegible]
Advanced general mathematics	434	312	837	271	240	633	[illegible]	[illegible]	[illegible]
Mathematics review	257	274	851	249	302	1,005	[illegible]	[illegible]	[illegible]
Consumer mathematics	896	396	1,291	562	339	1,097	[illegible]	[illegible]	[illegible]

Table 60.—Enrollment, by subject, of schools whose data were used in this study, by region

Subject	1st semester, 1951-52			2d semester, 1951-52			1st semester, 1952-53		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
NEW ENGLAND STATES[1]									
Arithmetic 7th grade	549	478	1,027	496	452	948	457	422	1,060
General mathematics 7th grade	299	250	549	294	246	615	432	415	847
Arithmetic 8th grade	594	548	1,082	474	504	978	490	466	1,121
General mathematics 8th grade	343	322	665	541	312	653	537	460	997
Elementary algebra	1,010	540	2,355	485	625	1,610	1,345	774	2,698
General mathematics	702	507	1,466	413	269	1,065	611	469	1,297
High school arithmetic	271	308	579	227	179	486	245	289	534
Plane geometry	819	377	1,713	309	308	1,018	1,087	427	1,669
Intermediate algebra	531	280	1,011	147	150	678	616	264	979
College algebra	15	15	30	26	17	43	12	13	25
Plane trigonometry	271	38	368	80	19	188	387	51	450
Solid geometry	309	37	660	64	12	143	316	36	352
Advanced general mathematics	70	22	132	66	20	121	28	0	28
Mathematics review	54	77	391	0	0	260	281	310	558
Consumer mathematics	56	9	271	50	0	256	65	11	76
MIDDLE ATLANTIC STATES[2]									
Arithmetic 7th grade	2,373	2,303	4,898	1,721	1,680	3,401	2,654	2,634	5,288
General mathematics 7th grade	831	748	1,579	718	643	1,361	871	1,136	2,007
Arithmetic 8th grade	2,206	2,144	4,533	1,528	1,476	3,004	2,739	2,652	5,391
General mathematics 8th grade	628	622	1,250	560	1,048	1,608	627	598	1,225
Elementary algebra	3,422	3,120	6,985	2,864	2,775	5,802	4,189	3,813	8,124
General mathematics	1,964	1,984	4,204	1,915	1,687	3,641	2,482	2,515	5,084
High school arithmetic	415	236	712	148	190	399	333	175	508
Plane geometry	2,439	2,310	5,112	1,966	1,870	3,964	2,675	2,312	4,991
Intermediate algebra	1,988	1,473	3,643	1,393	948	2,439	1,873	1,386	3,314
College algebra	112	69	181	126	43	169	167	60	227
Plane trigonometry	645	254	942	759	316	1,163	642	219	866
Solid geometry	323	89	494	397	117	538	488	156	644
Advanced general mathematics	176	149	355	130	278	498	175	279	454
Mathematics review	91	84	175	175	149	324	105	105	224
Consumer mathematics	431	280	773	375	158	535	457	281	738
EAST NORTH CENTRAL STATES[3]									
Arithmetic 7th grade	2,176	1,828	4,602	1,586	1,578	4,194	2,148	1,993	4,897
General mathematics 7th grade	284	299	583	297	267	564	267	241	508
Arithmetic 8th grade	1,911	1,797	4,901	1,775	1,664	4,536	2,138	2,228	5,128
General mathematics 8th grade	293	388	681	259	301	560	176	248	424
Elementary algebra	2,682	2,697	7,462	2,307	2,355	6,662	3,343	3,133	7,013
General mathematics	1,964	1,719	5,050	1,451	1,388	4,239	2,388	2,624	5,231
High school arithmetic	309	257	1,096	324	298	1,023	366	296	768
Plane geometry	1,563	1,247	3,338	1,181	1,023	3,057	1,914	1,482	4,304
Intermediate algebra	720	339	1,287	361	159	545	840	345	1,403
College algebra	39	26	199	95	47	221	90	56	200
Plane trigonometry	156	49	251	308	108	459	104	36	155
Solid geometry	185	50	322	201	60	457	226	54	362
Advanced general mathematics	93	33	140	96	43	138	75	42	117
Mathematics review	48	48	172	44	39	363	163	143	336
Consumer mathematics	123	153	307	121	186	305	95	84	208
WEST NORTH CENTRAL STATES[4]									
Arithmetic 7th grade	1,132	1,070	2,342	1,118	1,058	2,295	1,336	1,275	2,611
General mathematics 7th grade	270	279	549	227	247	553	311	325	636
Arithmetic 8th grade	1,407	1,292	2,724	1,065	1,222	2,322	1,650	1,542	3,192
General mathematics 8th grade	305	297	602	262	261	576	318	313	631
Elementary algebra	2,074	1,872	4,085	1,224	1,899	3,330	2,386	2,224	5,188
General mathematics	915	869	1,818	846	774	1,686	1,375	1,349	2,859
High school arithmetic	129	111	240	158	119	277	115	139	254
Plane geometry	1,410	1,054	2,464	1,313	999	2,350	1,530	1,112	2,670
Intermediate algebra	653	271	924	466	274	770	711	315	1,042
College algebra	84	28	112	66	27	93	67	45	112
Plane trigonometry	74	35	119	185	46	231	89	42	131
Solid geometry	162	34	196	142	44	187	170	55	225
Advanced general mathematics	6	6	12	12	10	22	23	12	35
Mathematics review	62	52	114	63	95	157	113	99	212
Consumer mathematics	102	45	203	109	49	313	136	77	213

[1] Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

[2] New York, New Jersey, Pennsylvania.

[3] Ohio, Indiana, Illinois, Michigan, Wisconsin.

[4] Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas.

Table 60.—Enrollment, by subject, of schools whose data were used in this study, by region—Continued

Subject	1st semester, 1951-52			2d semester, 1951-52			1st semester, 1952-53		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
SOUTH ATLANTIC STATES[5]									
Arithmetic 7th grade	1,460	1,416	2,876	1,173	1,238	2,411	1,582	1,509	3,091
General mathematics 7th grade	540	484	1,199	510	456	1,066	963	898	1,861
Arithmetic 8th grade	1,852	1,740	3,592	1,631	1,575	3,206	2,147	2,019	4,166
General mathematics 8th grade	1,127	1,173	2,486	1,036	1,012	2,234	1,414	1,292	2,706
Elementary algebra	2,157	2,529	4,819	1,808	2,146	4,087	2,723	3,013	5,816
General mathematics	2,147	2,458	4,746	2,015	2,241	4,398	3,153	3,453	6,606
High school arithmetic	177	237	504	137	214	428	247	295	631
Plane geometry	967	906	1,935	786	777	1,658	969	876	1,933
Intermediate algebra	1,058	936	2,087	762	719	1,577	1,034	1,041	2,251
College algebra	75	52	107	61	19	80	53	26	79
Plane trigonometry	124	26	150	87	36	123	102	12	144
Solid geometry	83	36	143	115	30	168	128	80	182
Advanced general mathematics	146	187	333	68	104	172	171	157	328
Mathematics review	18	20	38	53	44	97	23	18	61
Consumer mathematics	68	95	163	70	93	163	58	72	130
EAST SOUTH CENTRAL STATES[6]									
Arithmetic 7th grade	1,048	954	2,206	746	792	1,838	1,089	1,080	2,436
General mathematics 7th grade	162	180	342	199	209	408	262	232	494
Arithmetic 8th grade	1,070	993	2,321	841	820	1,841	998	1,009	2,287
General mathematics 8th grade	146	199	345	180	227	407	251	261	512
Elementary algebra	1,419	1,504	3,353	1,373	1,418	3,055	1,563	1,564	4,066
General mathematics	640	632	1,482	502	492	994	634	685	1,552
High school arithmetic	326	326	728	252	242	588	339	342	915
Plane geometry	750	598	1,407	665	554	1,252	777	590	1,367
Intermediate algebra	444	321	864	401	280	756	467	341	935
College algebra	11	6	17	8	6	14	7	6	13
Plane trigonometry	51	11	62	61	12	81	53	6	73
Solid geometry	64	16	98	72	15	87	67	18	113
Advanced general mathematics	11	14	25	3	5	8	42	23	65
Mathematics review	75	89	164	49	83	132	56	81	137
Consumer mathematics	3	5	8	3	5	8	3	3	6
WEST SOUTH CENTRAL STATES[7]									
Arithmetic 7th grade	1,629	1,579	3,208	1,542	1,526	3,068	1,776	1,754	3,530
General mathematics 7th grade	374	309	683	377	310	687	390	369	759
Arithmetic 8th grade	1,806	1,836	3,642	1,703	1,739	3,583	1,983	1,989	3,972
General mathematics 8th grade	325	302	627	171	139	310	309	284	593
Elementary algebra	2,592	2,559	5,520	2,348	2,310	4,823	2,840	2,854	5,986
General mathematics	960	889	2,206	932	869	2,009	1,328	1,301	2,629
High school arithmetic	184	275	459	159	204	363	224	280	504
Plane geometry	904	773	1,705	810	751	1,589	972	896	1,904
Intermediate algebra	768	735	1,627	729	676	1,425	1,026	911	1,967
College algebra	14	10	24	29	12	41	8	7	15
Plane trigonometry	59	23	82	50	26	76	20	4	24
Solid geometry	42	28	79	32	0	42	87	16	111
Advanced general mathematics	78	73	158	74	75	156	107	97	204
Mathematics review	10	5	15	0	0	0	20	11	31
Consumer mathematics	33	31	64	28	33	61	29	30	59
MOUNTAIN STATES[8]									
Arithmetic 7th grade	781	754	1,535	749	768	1,517	734	636	1,381
General mathematics 7th grade	8	9	17	8	9	17	7	17	24
Arithmetic 8th grade	784	715	1,523	776	733	1,533	825	849	1,693
General mathematics 8th grade	12	9	21	12	9	21	11	10	21
Elementary algebra	952	1,021	2,013	831	895	1,726	1,284	1,164	2,697
General mathematics	723	543	1,303	640	546	1,186	827	660	1,535
High school arithmetic	128	124	252	53	109	162	164	167	331
Plane geometry	656	449	1,141	508	433	941	779	530	1,346
Intermediate algebra	242	62	320	88	46	134	305	78	382
College algebra	6	0	6	0	0	0	4	1	6
Plane trigonometry	80	9	105	61	3	64	114	20	136
Solid geometry	6	0	6	95	17	122	12	1	13
Advanced general mathematics	0	0	0	0	0	0	33	31	64
Mathematics review	0	0	0	0	0	0	0	0	0
Consumer mathematics	16	6	22	17	7	24	17	1	18

[5] Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida.

[6] Kentucky, Tennessee, Alabama, Mississippi.

[7] Arkansas, Louisiana, Oklahoma, Texas.

[8] Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada.

Table 60.—Enrollment, by subject, of schools whose data were used in this study, by region—Continued

Subject	1st semester, 1951-52			2d semester, 1951-52			1st semester, 1952-53		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
PACIFIC STATES[1]									
Arithmetic 7th grade	2,218	2,193	4,411	2,068	2,007	4,363	2,122	1,946	4,443
General mathematics 7th grade	184	188	372	186	188	374	275	293	568
Arithmetic 8th grade	2,137	2,106	4,243	1,663	1,650	3,317	2,203	2,029	4,530
General mathematics 8th grade	210	208	418	195	187	382	301	390	691
Elementary algebra	1,652	1,508	3,390	1,708	1,288	3,350	2,172	1,607	4,277
General mathematics	1,190	767	2,329	1,131	625	2,134	1,686	1,059	3,256
High school arithmetic	350	206	556	399	398	797	457	281	738
Plane geometry	882	499	1,410	955	775	2,059	1,384	826	2,343
Intermediate algebra	400	153	697	269	93	480	610	132	742
College algebra	0	0	0	23	0	23	2	0	2
Plane trigonometry	134	7	201	258	37	317	153	20	173
Solid geometry	84	13	97	95	12	130	137	18	155
Advanced general mathematics	65	34	99	15	5	20	57	27	99
Mathematics review	5	13	18	9	7	16	69	44	126
Consumer mathematics	25	8	33	24	8	32	26	8	34

[1] Washington, Oregon, California.

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