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A comparison of quantitative terms needed in geography with those taught in arithmetic.

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Service Paper

A COMPARISON OF QUANTITATIVE TERMS NEEDED IN GEOGRAPHY
WITH THOSE TAUGHT IN ARITHMETIC

by

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CHAPTER I

THE PROBLEM AND DEFINITION OF TERMS USED

Introduction. In recent years there has been a growing conviction among many educators that the social studies reading materials present some difficult comprehension problems. Some of these authorities express the opinion that much of this problem is caused by a lack of understanding of the many quantitative terms involved. One phase of this quantitative problem in the social studies was the topic investigated in this service paper.

I. THE PROBLEM

Statement of the problem. It was the purpose of this study to make a comparison of the definite quantitative terms used in the geography series, now in use at the Elementary Demonstration School of Atlantic Union College, with the quantitative concepts taught in the arithmetic series used in the same school. This comparison was to reveal whether the arithmetics actually gave the pupils the readiness to comprehend the quantitative concepts presented in the geographies by the time the understandings were needed.

Limits imposed.

1. It was impossible to correlate the work of the arithmetics with the geographies page by page. Therefore it was not possible to be absolutely certain whether each concept had been taught before it was needed.

2. It seemed that the most practical way was to base the study on a three months differential. This means that the quantitative concepts needed to understand the geographies were taught in the arithmetics within the three months period before they were needed or at some previous time.

3. Just because a concept had been presented in the arithmetics did not mean that the child had an understanding of the concept when he read it in the geographies, especially if two quantitative terms were united. For example: the pupil might have a fair understanding of the number 250 and of a gallon, but a very poor concept of 250 gallons. However, in this study such a combination was considered as understood.

Justification of the study. Textbook reading should be in language comprehended by the pupil in the grade for which it is written. Social studies reading material should not be an exception to this policy. Yet it is acknowledged by many educators, as revealed in the "Review of Literature," that a very definite reading comprehension problem does exist in the social studies reading materials.

The writer was unable to find a record of any attempt in previous research to determine whether an arithmetic series provided a thorough readiness for the quantitative concepts presented in a geography series by the time those concepts were presented in the geographies.

Plan of organization. Chapter II is a review of the literature bearing upon the subject of this service paper. Revealed in Chapter III are the sources from which this comparison was made and the method of procedure used.

There are nine tables containing the quantitative terms and their treatment. Table X is a tabulation of the totals of the first nine tables

with the last column showing the percentage of readiness (i. e., the per cent of items in geography texts for which readiness was provided in the arithmetic texts) at the various levels. The graph that follows pictures the results of the study and completes Chapter IV. Lastly, Chapter V gives a summary of the findings and states the conclusions drawn from the comparisons. It also indicates related problems for future investigation.

II DEFINITION OF TERMS USED

Quantitative terms. Any word, group of words, or number designating quantity.

Definite quantitative terms. Any word, group of words, or number with arithmetical definiteness such as: fifty, one-fourth mile, acre, ten degrees, 1860, three times as much as.

Indefinite quantitative terms. Words or groups of words such as: many, small, few, near, far, hundreds, thousands, hundreds of thousands.

CHAPTER II

REVIEW OF THE LITERATURE

Problems in the social studies. Much has been written in the last decade or two in regard to problems encountered in social studies materials. Many educators have set forth their opinions and findings on this topic. Luella Cole, for instance, reminds us that in both history and geography "The acquisition of a new language is then a basic problem in these subjects."¹ Gray states that "Challenging reading problems arise in the field of geography, which is recognized as one area of the social studies."² On the same page he gives a long list of problems in the social studies. Among them are: "Attaching appropriate time and place significance to events;" "Following the historical order of events;" and "Interpreting facts presented in their appropriate time-and-place setting." These are problems because of the immaturity and inexperience of the child at the elementary level. Cole says that "No child's environment and personal experiences are sufficient to furnish an adequate background for most of the ideas presented to him in the average textbook in either geography or history."³

1 Luella Cole, Psychology of Elementary School Subjects, (New York: Farrar and Rinehart, 1934) p. 66

2 William S. Gray, "Reading as an Aid to Learning," Forty-Eighth Yearbook of the National Society for the Study of Education, Part II (Chicago, Illinois: The University of Chicago Press, 1949), p. 251

3 Cole, op. cit., p. 76

Michaelis says on this same topic,

If a child has not had a rich background of experience in building meaningful concepts, he cannot grasp the meaning intended by the writer, for words have meaning only if the child can bring meaning to them. The development of rich concepts and meaningful vocabulary are basic to the efficient use of reading in the social studies.⁴

And further on this point Wesley and Adams have this comment:

Even though they [the children] can read in an elementary fashion, it should not be assumed that they will automatically learn new connotations and new concepts, understand maps, graphs, and charts, develop a sense of time and chronology, or be able to make generalizations.⁵

From these statements and many others that might be added it was clearly evident that there are many problems presented in social studies materials. It was observed that many of these problems were aggravated by the use of quantitative terms not comprehended by children of elementary school age.

Since this service paper deals with the quantitative aspect of these problems, more of the views of current writers on this angle of the topic will be noted.

Emphasis on the quantitative problem. Horn,⁶ who acknowledges a special interest in the use of quantitative terms as used in the social studies has said that, "Very few of the important concepts in geography and the social studies can be understood unless the student is able to

4. John U. Michaelis, Social Studies for Children in a Democracy, (New York: Prentice-Hall, Inc., 1950) p. 302.

5. Edgar B. Wesley and Mary A. Adams, Teaching Social Studies in Elementary Schools, (Boston: D. C. Heath and Company, 1946), p. 277

6. Ernest Horn, "Arithmetic in the Elementary-School Curriculum," Fiftieth Yearbook of the National Society for the Study of Education, part II (Chicago, Illinois: The University of Chicago Press, 1951), p. 9

deal intelligently with quantitative aspects."⁷ The same author stated further that, "Students are commonly deficient in their understanding of large numbers and are unable to interpret units of measurement in terms of their personal experience."⁸ In harmony with these statements from Horn, but with a note of encouragement, is the following comment by Mary Kelty,

Somewhat comparable progress has been made in distinguishing stages of growth in quantitative thinking. Social studies teachers in general probably are not familiar with such studies. A social science club or a Local Council affiliated with the National Council might therefore find it worthwhile to spend some time reviewing what has been done, for some of our most baffling problems and those with which we have been least satisfied are basically quantitative in nature: concepts of time development, grasp of the quantitative aspects of modern social life, such as production in agriculture and industry, population studies, etc.⁹

In this last quotation the problem of understanding the concept of time development is mentioned. This problem is one that is difficult of comprehension to the child most of the way through the elementary grades.

Wesley and Adams substantiate this by saying:

"Every study of time...shows that pupils of the early grades simply cannot grasp dates. Decades and centuries and the sequence of periods and movements are beyond their experience."¹⁰

"Writing further on this topic the same authors said:

7 Ernest Horn, Methods of Instruction in the Social Studies, Report of the Commission on the Social Studies, Part IV (New York: Charles Scribner's Sons) p. 189

8 Ibid., p. 191

9 Mary G. Kelty, "The Middle Grade Program: Articulation with the Upper Grades," Seventeenth Yearbook of the National Council for the Social Studies, (Washington, D. C.: National Education Association, 1947) p. 231

10 Edgar B. Wesley and Mary A. Adams, Teaching Social Studies in Elementary Schools, (Boston: D. C. Heath and Company, 1946), p. 299

...Such approximate dates as "the first decade of the twentieth century," "the last part of the eighteenth century," or "the third decade of the nineteenth century" are difficult for adults, and pointless for pupils of the elementary grades....The point here is, not that approximate dates are valueless, but that they gain reality only when they are enclosed within the limits of definite dates.¹¹

Analysis of the quantitative problem. In a recent and widely used textbook by Lee and Lee recognition of this problem of quantitative references in social studies material is also given. They not only suggest a reason for the existence of these problems but recommend a remedy. This is their important comment:

The analysis of social-studies and science materials suggest a type of arithmetical experience not commonly found in arithmetic books nor stressed by arithmetic teachers. It tends to show that we cannot read intelligently either in the field of the social studies or the sciences without constant need for understanding the quantitative references found in social studies material. Teachers need to discuss such references when they occur and be sure that the pupils understand their significance.¹²

A thorough understanding of mathematical concepts, then, would give better comprehension of social studies material according to the above quotation. Not enough time has been given to help the pupils to understand the quantitative terms used in the social studies. According to Young:

Social studies materials would be more meaningful to pupils if the pupils had more adequate experiences to develop the meanings and values implicit in these materials; if the materials employed definite quantitative terms; if the pupils experienced direct teaching of social studies vocabulary; if proficiency in general usage of the social studies language were sought rather than proficience in reading alone!¹³

¹¹ Edgar B. Wesley and Mary A. Adams, Teaching Social Studies in Elementary Schools, (Boston: D. C. Heath and Company, 1946), p. 303

¹² J. Murray Lee and Dorris M. Lee, The Child and His Curriculum, (New York: Second Edition, Appleton-Century-Crofts, Inc., 1950), p. 464

¹³ William Young, "Recent Research on Reading in the Social Studies," Education, 62:25, Sept., 1941

In the summary of Ryan's study of the "Comprehension of Quantitative Terms in Geography at the Fifth Grade Level," she lists as part of her findings these two items:

1. The textbook analysis showed that quantitative terms were used in profusion in the text; the indefinite form was used more frequently than the definite form.

2. Both definite and indefinite terms were difficult for children to interpret in the textbook situations. The indefinite terms led to more misunderstandings than did the definite terms.¹⁴

Horn agrees with this finding. He remarks that, "Every investigator has shown the incidence of arithmetical terms to be very large--how large depends upon how broadly 'arithmetical terms' is defined....In some recent geography texts the quantitative words ran as high as one out of seven."¹⁵

Going still further in the analysis he says:

Indefinite quantitative terms, such as a great deal, many, far, thick, have been shown to be more difficult than are definite statements of quantity. It is hard, even in the case of definite statements, for students to approximate the author's meaning closely enough to make an intelligent judgment of quantity. Specific statements have the advantage, however, of giving the student something to work on. Indefinite terms afford little clue as to the amounts that the author had in mind.¹⁶

Some of the points emphasized in the analysis of the quantitative problem will be reemphasized in this next and last section of the review of literature.

¹⁴ Grace M. Ryan, "A Study of the Comprehension of Quantitative Terms in Geography at the Fifth Grade Level," (unpublished Master's thesis, University of Iowa, Iowa City, 1935), p. 39

¹⁵ Ernest Horn, "Arithmetic in the Elementary-School Curriculum," Fiftieth Yearbook of the National Society for the Study of Education, Part II (Chicago, Illinois: The University of Chicago Press, 1951), p. 10

¹⁶ Ibid., pp. 12, 13

Solution to the problem. According to Morton, "The prime objective of arithmetic teaching, according to the meaning theory, is the development in the pupils of the ability to do quantitative thinking."¹⁷ But Lee and Lee, quoted previously, state that, "relatively little work is given which helps pupils to understand the quantitative references found in social studies material."¹⁸ The stress therefore should be on better teaching of quantitative materials in the schools.

Letton states that, "Newer arithmetic practice stresses the development of meanings, ideas, and principles in order for children to do quantitative thinking."¹⁹ Meanings and ideas have to do with understanding the vocabulary of quantitative terms.

Brueckner and Grossnickle in listing terms to be considered in the evaluation of arithmetic textbooks list these two among others, "Stress on quantitative aspects of experiences in the life of the child to enrich them and make them significant," and the "Intercorrelation of arithmetic with other school subjects."²⁰ Writing to the same point Horn states it thus:

An especially designed program of instruction in arithmetic is essential, and such a program should include not only provision for systematic and meaningful learning in the arithmetic class but also

¹⁷ Robert L. Morton, Teaching Arithmetic in the Elementary School, Volume II, Intermediate Grades, (New York: Silver Burdett Company, 1938), p. 16

¹⁸ Lee and Lee, op. cit., p. 464

¹⁹ Mildred Letton, "Adjusting Reading Activities in Various School Subjects in the Middle Grades," Supplementary Educational Monographs, Number 52. Proceedings of the Conference on Reading October 1941. (Chicago: The University of Chicago) p. 207

²⁰ Leo. J. Brueckner and Foster E. Grossnickle, How to Make Arithmetic Meaningful, (Philadelphia: The John C. Winston Company, 1947), p. 490

careful attention to the mathematical needs and contribution of other areas.²¹

This same author expresses his mind on meaningful arithmetic by saying:

The more seriously the meaning theory of arithmetic is taken and the greater the emphasis upon the development of quantitative thinking, the better the argument for including, as a part of the instructional plan in arithmetic, the development of concepts and abilities needed to deal with both definite and indefinite terms.²²

Speaking of the modern program in arithmetic Brueckner and Grossnickle emphasize that, "The modern arithmetic program requires a stimulating environment of concrete materials which give meaning and significance to the work being done."²³

Emphasizing this thought further, Morton remarks, "If the pupils are to know and understand weights and measures, they must use them. They should have actual experiences with the measures studied. The mere memorizing of tables will be of little value."²⁴ Rosenquist, in speaking of the importance of experience in learning, says, "Educators are in complete agreement in applying the number system to quantitative situations as essential to the child's development of an understanding of arithmetic."²⁵

21 Ernest Horn, "Arithmetic in the Elementary-School Curriculum," Fiftieth Yearbook of the National Society for the Study of Education, Part II (Chicago, Illinois: The University of Chicago Press, 1951), p. 18

22 Ibid., p. 14

23 Brueckner and Grossnickle, op. cit., p. 474

24 Robert L. Morton, Teaching Arithmetic in the Elementary School, Volume II, Intermediate Grades, (New York: Silver Burdett Co., 1938) p. 424

25 Lucy Lynde Rosenquist, Young Children Learn to Use Arithmetic, (Boston: Ginn and Company, 1949), p. 42

And Spitzer, in speaking of measures, puts it this way: "To make these standards of reference function in getting a better idea of the quantity involved, every child should have many experiences and exercises with the special units that are to be used as standards."²⁶

From this review of the literatures it is evident that (1) there are many problems involved in the understanding of social studies materials; (2) a great deal of emphasis has been placed on the lack of understanding of the quantitative problems involved in social studies; (3) these quantitative problems have been quite thoroughly analyzed by many recognized authorities in the field of education both in arithmetic and the social sciences; (4) a number of good suggestions have been made by these authorities which, if followed, should aid greatly in solving the problem presented by the quantitative terms in the social studies.

²⁶ Herbert F. Spitzer, The Teaching of Arithmetic, (Boston: Houghton Mifflin Company, 1948), p. 245

CHAPTER III

SOURCES AND PROCEDURE

Sources of data. The textbooks used as sources in this comparative study were:

Geographies

Our Neighbors at Home--Grade 3

Neighbors in the United States and Canada--Grade 5

Neighbors Across the Seas--Grade 7

These books were from the geography series recently published by the John C. Winston Company.

Arithmetics

Study Arithmetics Series--Grades 1-7 from Scott, Foresman and Company.

Method of Procedure. Because of the very large number of quantitative terms used in the geographies, this study was confined to the use of only the definite quantitative terms.

For the same reason the geography books for grades three, five, and seven were chosen as a sampling of the series.

This study did not include references to page numbers, charts or graphs, or information contained in the appendices.

The cardinal numbers from one to twenty were not included in the terms classified except when connected with some other quantitative term, such as two acres, one pound, four hours, or similar terms. The readiness given in arithmetic for grades one and two indicated that the understanding of

the quantities from one to twenty should not be a problem at the beginning of grade three.

The three geography books, listed under sources, were read and the definite quantitative terms were underlined with red. Each of the three geography books was divided into thirds, making nine divisions in all, and a table was prepared for each third of each book. Since this was not a frequency study, only the different definite quantitative terms were used in this comparison.

The terms for each table were classified under the following four main divisions: measurements, enumerations, fraction concepts and comparative terms. These four main divisions were subdivided into related groups. For example, measurement was subdivided into length, area and volume, weight, liquid and dry measure, time, temperature, rainfall, latitude and longitude. The terms within each group were arranged in the order of their size.

Then the definite quantitative terms of each of the nine tables were checked with the arithmetic books. This checking was done by the use of the Teacher's Guide Book and the indices and content material of the textbooks.

Each of the nine tables contained three columns of information needed for the comparison. The quantitative terms were listed in the first column. An X was used in the second column to indicate that a readiness had been provided in the arithmetic books for the term used. An X in the third column showed that no readiness had been provided in the arithmetics for that term.

Table X was made to show the totals for each column of each table and the percentage of readiness provided by the arithmetics for each third of each geography book.

The graph was drawn to picture the main findings of this study. The concluding chapter calls attention to the areas for which no readiness had been given in the arithmetics by the time it was needed in the geographies.

CHAPTER IV

TABLES OF COMPARISON

This chapter is composed of the tables which are a disclosure of the results found in this analysis. The three geography books under study were each divided into thirds. The different definite quantitative terms of each third of each book were then placed on the appropriate table for the comparison. The title at the top of each of the nine tables tells from what section of the geography books the terms were taken.

The first column of the tables shows a list of the terms in a certain section as revealed by the title of the table.

Column two shows whether a readiness had been given in the arithmetics by the time the term was used in the geographies.

Column three shows when no readiness for the term had been given in the arithmetics.

After each quantitative term in each table had been checked according to the information in the arithmetics, all the columns of each table were totaled. These totals, with the percentage of readiness given for each third of each book, are shown in Table X.

The graph at the end of the chapter pictures the main findings of this project.

The ten tables and the graph are found on the following pages in this chapter.

TABLE I

READINESS PROVIDED BY ARITHMETIC SERIES FOR DEFINITE
 QUANTITATIVE TERMS INCLUDED IN FIRST THIRD OF GRADE 3 GEOGRAPHY

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 3</u>										<u>Not Taught</u> <u>Before Needed</u>	
1. Measurements												
<u>Length</u>												
half an inch	-	-	-	-	-	-	-	-	-	-	-	X
an inch	-	-	-	-	-	X	-	-	-	-	-	-
six inches	-	-	-	-	-	X	-	-	-	-	-	-
ten inches	-	-	-	-	-	X	-	-	-	-	-	-
a mile	-	-	-	-	-	-	-	-	-	-	-	X
two miles	-	-	-	-	-	-	-	-	-	-	-	X
three miles	-	-	-	-	-	-	-	-	-	-	-	X
five miles	-	-	-	-	-	-	-	-	-	-	-	X
ten miles	-	-	-	-	-	-	-	-	-	-	-	X
fifteen miles	-	-	-	-	-	-	-	-	-	-	-	X
twenty-five miles	-	-	-	-	-	-	-	-	-	-	-	X
fifty miles	-	-	-	-	-	-	-	-	-	-	-	X
a hundred miles	-	-	-	-	-	-	-	-	-	-	-	X
<u>Liquid and Dry Measure</u>												
twenty quarts	-	-	-	-	-	X	-	-	-	-	-	-
forty quarts	-	-	-	-	-	X	-	-	-	-	-	-
sixty quarts	-	-	-	-	-	X	-	-	-	-	-	-

TABLE I CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 3</u>										<u>Not Taught</u> <u>Before Needed</u>
<u>Time</u>											
four minutes	-	-	-	-	-	-	-	-	-	-	X
two o'clock	-	-	-	-	-	X	-	-	-	-	-
four o'clock	-	-	-	-	-	X	-	-	-	-	-
five o'clock	-	-	-	-	-	X	-	-	-	-	-
six o'clock	-	-	-	-	-	X	-	-	-	-	-
nine o'clock	-	-	-	-	-	X	-	-	-	-	-
ten o'clock	-	-	-	-	-	X	-	-	-	-	-
half-past eight	-	-	-	-	-	X	-	-	-	-	-
half an hour	-	-	-	-	-	X	-	-	-	-	-
two hours	-	-	-	-	-	X	-	-	-	-	-
four hours	-	-	-	-	-	X	-	-	-	-	-
five hours	-	-	-	-	-	X	-	-	-	-	-
day	-	-	-	-	-	X	-	-	-	-	-
daily	-	-	-	-	-	-	-	-	-	-	X
every week	-	-	-	-	-	X	-	-	-	-	-
next week	-	-	-	-	-	X	-	-	-	-	-
two weeks	-	-	-	-	-	X	-	-	-	-	-
three months	-	-	-	-	-	X	-	-	-	-	-
four months	-	-	-	-	-	X	-	-	-	-	-
two years later	-	-	-	-	-	X	-	-	-	-	-

2. Enumerations

People, Animals, Things

TABLE I CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 3</u>					<u>Not Taught</u> <u>Before Needed</u>				
thirty pupils	-	-	-	-	X	-	-	-	-	-
100 people	-	-	-	-	X	-	-	-	-	-
200 people	-	-	-	-	X	-	-	-	-	-
sixty families	-	-	-	-	X	-	-	-	-	-
forty cows	-	-	-	-	X	-	-	-	-	-
a hundred rats	-	-	-	-	X	-	-	-	-	-
a thousand sheep	-	-	-	-	-	-	-	-	-	X
three hundred jars	-	-	-	-	X	-	-	-	-	-
dozen	-	-	-	-	X	-	-	-	-	-
<u>Money</u>										
two cents	-	-	-	-	X	-	-	-	-	-
five cents	-	-	-	-	X	-	-	-	-	-
ten cents	-	-	-	-	X	-	-	-	-	-
fifty cents	-	-	-	-	-	-	-	-	-	X
seventy-five cents	-	-	-	-	-	-	-	-	-	X
ninety cents	-	-	-	-	-	-	-	-	-	X
a dollar	-	-	-	-	-	-	-	-	-	X
a dollar ten	-	-	-	-	-	-	-	-	-	X
a dollar twenty	-	-	-	-	-	-	-	-	-	X
a dollar thirty	-	-	-	-	-	-	-	-	-	X
seven dollars	-	-	-	-	-	-	-	-	-	X
\$210	-	-	-	-	-	-	-	-	-	X
six thousand dollars	-	-	-	-	-	-	-	-	-	X

TABLE III

READINESS PROVIDED BY ARITHMETIC SERIES FOR DEFINITE
QUANTITATIVE TERMS INCLUDED IN LAST THIRD OF GRADE 3 GEOGRAPHY

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Last Third of Grade 3</u>										<u>Not Taught</u> <u>Before Needed</u>	
1. Measurements												
<u>Length</u>												
two feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
four blocks	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
<u>Area and Volume</u>												
square block	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
<u>Temperature</u>												
ten degrees below zero	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
<u>Time</u>												
eighteen minutes	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
seven o'clock	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
once every week	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
one week	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
twice every week	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
six months	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
twenty months	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
one year	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
eight years	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
nine years	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
ten years	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-

TABLE IV

READINESS PROVIDED BY ARITHMETIC SERIES FOR DEFINITE
 QUANTITATIVE TERMS INCLUDED IN THE FIRST THIRD OF GRADE 5 GEOGRAPHY

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 5</u>	<u>Not Taught</u> <u>Before Needed</u>
1. Measurements		
<u>Length</u>		
twenty inches	<u>X</u>	
fifty-two inches	<u>X</u>	
four-foot lengths	<u>X</u>	
6 feet	<u>X</u>	
ten feet	<u>X</u>	
20 feet	<u>X</u>	
21 feet	<u>X</u>	
28 foot tide	<u>X</u>	
30 feet	<u>X</u>	
36 feet	<u>X</u>	
36½ feet in diameter		<u>X</u>
40 feet	<u>X</u>	
167 feet	<u>X</u>	
200 feet	<u>X</u>	
232 feet	<u>X</u>	
250 feet below sea level	<u>X</u>	
276 feet	<u>X</u>	
326 feet	<u>X</u>	

TABLE IV CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 2</u>							<u>Not Taught</u> <u>Before Needed</u>			
350 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
364 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
400 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
480 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
560 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
600 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
700 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
725 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
1000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
1500 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
6000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
7000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
8000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
9000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
9600 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
10,000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
15,000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-	-
a mile-high	-	-	-	-	-	<u>X</u>	-	-	-	-	-
one mile	-	-	-	-	-	<u>X</u>	-	-	-	-	-
two miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-
four miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-
five miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-
15 miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-

TABLE IV CONTINUED

<u>Terms</u> <u>In Geography</u>						<u>Taught in Arithmetic</u> <u>Before Grade 5</u>						<u>Not Taught</u> <u>Before Needed</u>
30 miles	-	-	-	-	-	X	-	-	-	-	-	-
50 miles	-	-	-	-	-	X	-	-	-	-	-	-
60 miles	-	-	-	-	-	X	-	-	-	-	-	-
80 miles	-	-	-	-	-	X	-	-	-	-	-	-
90 miles	-	-	-	-	-	X	-	-	-	-	-	-
91 miles	-	-	-	-	-	X	-	-	-	-	-	-
93 miles	-	-	-	-	-	X	-	-	-	-	-	-
100 miles	-	-	-	-	-	X	-	-	-	-	-	-
150 miles	-	-	-	-	-	X	-	-	-	-	-	-
254 miles	-	-	-	-	-	X	-	-	-	-	-	-
500 miles	-	-	-	-	-	X	-	-	-	-	-	-
2000 miles	-	-	-	-	-	X	-	-	-	-	-	-
2300 miles	-	-	-	-	-	X	-	-	-	-	-	-
3000 miles	-	-	-	-	-	X	-	-	-	-	-	-
4000 miles	-	-	-	-	-	X	-	-	-	-	-	-
seven thousand miles	-	-	-	-	-	X	-	-	-	-	-	-
<u>Area and Volume</u>												
a square mile	-	-	-	-	-	-	-	-	-	-	-	X
hundred square miles	-	-	-	-	-	-	-	-	-	-	-	X
an acre	-	-	-	-	-	-	-	-	-	-	-	X
10 acres	-	-	-	-	-	-	-	-	-	-	-	X
30,000 acres	-	-	-	-	-	-	-	-	-	-	-	X

TABLE IV CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>				
<u>Weight</u>										
a pound	-	-	-	-	-	<u>X</u>	-	-	-	-
400 pounds	-	-	-	-	-	<u>X</u>	-	-	-	-
500 pounds	-	-	-	-	-	<u>X</u>	-	-	-	-
2000 pounds	-	-	-	-	-	<u>X</u>	-	-	-	-
3000 pounds	-	-	-	-	-	<u>X</u>	-	-	-	-
Fifty million pounds	-	-	-	-	-	-	-	-	-	<u>X</u>
three billion pounds	-	-	-	-	-	-	-	-	-	<u>X</u>
6½ billion pounds	-	-	-	-	-	-	-	-	-	<u>X</u>
1000 tons	-	-	-	-	-	<u>X</u>	-	-	-	-
fifty million tons	-	-	-	-	-	-	-	-	-	<u>X</u>
<u>Liquid and Dry Measure</u>										
96 crates cantaloupe	-	-	-	-	-	-	-	-	-	<u>X</u>
1½ million crates cantaloupe	-	-	-	-	-	-	-	-	-	<u>X</u>
3½ million crates lettuce	-	-	-	-	-	-	-	-	-	<u>X</u>
6 million boxes apples a year	-	-	-	-	-	-	-	-	-	<u>X</u>
60 bushels	-	-	-	-	-	<u>X</u>	-	-	-	-
70 bushels	-	-	-	-	-	<u>X</u>	-	-	-	-
two million barrels of apples	-	-	-	-	-	-	-	-	-	<u>X</u>
ten million barrels of oil	-	-	-	-	-	-	-	-	-	<u>X</u>
<u>Time</u>										
an hour	-	-	-	-	-	<u>X</u>	-	-	-	-
ten hours	-	-	-	-	-	<u>X</u>	-	-	-	-
twelve hours	-	-	-	-	-	<u>X</u>	-	-	-	-

TABLE IV CONTINUED

<u>In</u> <u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>				
14 hours	-	-	-	-	<u>X</u>	-	-	-	-	-
17 hours	-	-	-	-	<u>X</u>	-	-	-	-	-
18 hours	-	-	-	-	<u>X</u>	-	-	-	-	-
4 days and 15 $\frac{1}{2}$ hours	-	-	-	-	<u>X</u>	-	-	-	-	-
21 days	-	-	-	-	<u>X</u>	-	-	-	-	-
220 days	-	-	-	-	<u>X</u>	-	-	-	-	-
twice weekly	-	-	-	-	<u>X</u>	-	-	-	-	-
three weeks	-	-	-	-	<u>X</u>	-	-	-	-	-
ten months	-	-	-	-	<u>X</u>	-	-	-	-	-
a year	-	-	-	-	<u>X</u>	-	-	-	-	-
two years	-	-	-	-	<u>X</u>	-	-	-	-	-
five years	-	-	-	-	<u>X</u>	-	-	-	-	-
ten years	-	-	-	-	<u>X</u>	-	-	-	-	-
30 years	-	-	-	-	<u>X</u>	-	-	-	-	-
50 years ago	-	-	-	-	<u>X</u>	-	-	-	-	-
80 years	-	-	-	-	<u>X</u>	-	-	-	-	-
200 years	-	-	-	-	<u>X</u>	-	-	-	-	-
400 years	-	-	-	-	<u>X</u>	-	-	-	-	-
five hundred years	-	-	-	-	<u>X</u>	-	-	-	-	-
two hundred years	-	-	-	-	<u>X</u>	-	-	-	-	-
1000 years old	-	-	-	-	<u>X</u>	-	-	-	-	-
2000 years old	-	-	-	-	<u>X</u>	-	-	-	-	-
3800 years old	-	-	-	-	<u>X</u>	-	-	-	-	-

TABLE IV CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 5</u>								<u>Not Taught</u> <u>Before Needed</u>	
1910	-	-	-	-	-	-	-	-	-	<u>X</u>
1930	-	-	-	-	-	-	-	-	-	<u>X</u>
1940	-	-	-	-	-	-	-	-	-	<u>X</u>
1944	-	-	-	-	-	-	-	-	-	<u>X</u>
1949	-	-	-	-	-	-	-	-	-	<u>X</u>
1950	-	-	-	-	-	-	-	-	-	<u>X</u>
1960	-	-	-	-	-	-	-	-	-	<u>X</u>
<u>Temperature</u>										
17 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-
32 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-
36 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-
50 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-
60 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-
70 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-
80 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-
90 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-
92 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-
100 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-
125 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-
40 degrees below zero	-	-	-	-	-	<u>X</u>	-	-	-	-
60 degrees below zero	-	-	-	-	-	<u>X</u>	-	-	-	-
68 degrees below zero	-	-	-	-	-	<u>X</u>	-	-	-	-
85 degrees below zero	-	-	-	-	-	<u>X</u>	-	-	-	-

TABLE IV CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>				
15 degrees	-	-	-	-	-	-	-	-	-	<u>X</u>
75 degrees	-	-	-	-	-	-	-	-	-	<u>X</u>
80 degrees	-	-	-	-	-	-	-	-	-	<u>X</u>
90 degrees north of Equator	-	-	-	-	-	-	-	-	-	<u>X</u>
360 degrees in a circle	-	-	-	-	-	-	-	-	-	<u>X</u>
2. Enumerations										
<u>People, Animals, Things</u>										
50 men	-	-	-	-	-	<u>X</u>	-	-	-	-
220 persons per square mile	-	-	-	-	-	-	-	-	-	<u>X</u>
three hundred voters	-	-	-	-	-	<u>X</u>	-	-	-	-
400 people	-	-	-	-	-	<u>X</u>	-	-	-	-
2500 people	-	-	-	-	-	<u>X</u>	-	-	-	-
4000 people	-	-	-	-	-	<u>X</u>	-	-	-	-
5700 people	-	-	-	-	-	<u>X</u>	-	-	-	-
7000 people	-	-	-	-	-	<u>X</u>	-	-	-	-
twelve thousand people	-	-	-	-	-	<u>X</u>	-	-	-	-
25,000 people	-	-	-	-	-	<u>X</u>	-	-	-	-
40,000 people	-	-	-	-	-	<u>X</u>	-	-	-	-
80,000 gold seekers	-	-	-	-	-	<u>X</u>	-	-	-	-
300,000 people	-	-	-	-	-	-	-	-	-	<u>X</u>
600,000 people	-	-	-	-	-	-	-	-	-	<u>X</u>
a million persons	-	-	-	-	-	-	-	-	-	<u>X</u>
one and one-half million tourists	-	-	-	-	-	-	-	-	-	<u>X</u>

TABLE IV CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 5</u>							<u>Not Taught</u> <u>Before Needed</u>	
2,900,000 people	-	-	-	-	-	-	-	-	<u>X</u>
three million people	-	-	-	-	-	-	-	-	<u>X</u>
twelve million people	-	-	-	-	-	-	-	-	<u>X</u>
2000 sheep	-	-	-	-	<u>X</u>	-	-	-	-
7,745 wolf skins	-	-	-	-	<u>X</u>	-	-	-	-
ten thousand deer	-	-	-	-	<u>X</u>	-	-	-	-
13,248 beaver skins	-	-	-	-	<u>X</u>	-	-	-	-
21,068 mink skins	-	-	-	-	<u>X</u>	-	-	-	-
thirty thousand animals in herd	-	-	-	-	<u>X</u>	-	-	-	-
30,999 fox skins	-	-	-	-	<u>X</u>	-	-	-	-
42,235 skunk skins	-	-	-	-	<u>X</u>	-	-	-	-
155,567 weasel skins	-	-	-	-	<u>X</u>	-	-	-	<u>X</u>
228,803 squirrel skins	-	-	-	-	-	-	-	-	<u>X</u>
581,862 muskrat skins	-	-	-	-	-	-	-	-	<u>X</u>
85 million salmon	-	-	-	-	-	-	-	-	<u>X</u>
11 states	-	-	-	-	<u>X</u>	-	-	-	-
15 states	-	-	-	-	<u>X</u>	-	-	-	-
twenty-one state names	-	-	-	-	<u>X</u>	-	-	-	-
31 parks	-	-	-	-	<u>X</u>	-	-	-	-
forty-eight states	-	-	-	-	<u>X</u>	-	-	-	-
53 bells	-	-	-	-	<u>X</u>	-	-	-	-
104 districts	-	-	-	-	<u>X</u>	-	-	-	-
150 French ships	-	-	-	-	<u>X</u>	-	-	-	-

TABLE IV CONTINUED

<u>Terms</u> In <u>Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>				
1000 things	-	-	-	-	<u>X</u>	-	-	-	-	-
6000 ships	-	-	-	-	<u>X</u>	-	-	-	-	-
a dozen pairs	-	-	-	-	<u>X</u>	-	-	-	-	-
<u>Money</u>										
thirty cents a quart	-	-	-	-	<u>X</u>	-	-	-	-	-
ninety-four cents of every dollar	-	-	-	-	<u>X</u>	-	-	-	-	-
a dollar	-	-	-	-	<u>X</u>	-	-	-	-	-
\$2	-	-	-	-	<u>X</u>	-	-	-	-	-
one hundred dollars	-	-	-	-	<u>X</u>	-	-	-	-	-
two million dollars	-	-	-	-	-	-	-	-	<u>X</u>	-
five million dollars	-	-	-	-	-	-	-	-	<u>X</u>	-
ten million dollars	-	-	-	-	-	-	-	-	<u>X</u>	-
fifteen million dollars	-	-	-	-	-	-	-	-	<u>X</u>	-
56 million dollars	-	-	-	-	-	-	-	-	<u>X</u>	-
3. Fraction Concepts										
<u>Fractions</u>										
half	-	-	-	-	<u>X</u>	-	-	-	-	-
one-fourth	-	-	-	-	<u>X</u>	-	-	-	-	-
three-fourths	-	-	-	-	<u>X</u>	-	-	-	-	-
one-third	-	-	-	-	<u>X</u>	-	-	-	-	-
two-thirds	-	-	-	-	<u>X</u>	-	-	-	-	-
one-sixth	-	-	-	-	<u>X</u>	-	-	-	-	-
six-sevenths	-	-	-	-	-	-	-	-	<u>X</u>	-

TABLE IV CONTINUED

<u>Terms</u> <u>In Geography</u>											<u>Taught in Arithmetic</u> <u>Before Grade 5</u>	<u>Not Taught</u> <u>Before Needed</u>
<u>Per cents</u>												
3%	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
5%	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
10%	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
15%	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
20%	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
25%	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
30%	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
35%	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
40%	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
97%	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
4. Comparative Terms												
first	-	-	-	-	-	-	-	-	-	-	<u>X</u>	-
second	-	-	-	-	-	-	-	-	-	-	<u>X</u>	-
third	-	-	-	-	-	-	-	-	-	-	<u>X</u>	-
fifth	-	-	-	-	-	-	-	-	-	-	<u>X</u>	-
tenth	-	-	-	-	-	-	-	-	-	-	<u>X</u>	-
double	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
as large as	-	-	-	-	-	-	-	-	-	-	<u>X</u>	-
five times as large as	-	-	-	-	-	-	-	-	-	-	<u>X</u>	-
three times as much as	-	-	-	-	-	-	-	-	-	-	<u>X</u>	-
one for every three	-	-	-	-	-	-	-	-	-	-	<u>X</u>	-
nine to one	-	-	-	-	-	-	-	-	-	-	<u>X</u>	-

TABLE IV CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>				
one out of every ten	-	-	-	X	-	-	-	-	-	-
three out of every four	-	-	-	X	-	-	-	-	-	-
three out of every hundred	-	-	-	X	-	-	-	-	-	-
two out of every three	-	-	-	X	-	-	-	-	-	-
57 out of 100	-	-	-	X	-	-	-	-	-	-
93 out of 100	-	-	-	X	-	-	-	-	-	-

TABLE V

READINESS PROVIDED BY ARITHMETIC SERIES FOR DEFINITE
QUANTITATIVE TERMS INCLUDED IN SECOND THIRD OF GRADE 5 GEOGRAPHY

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Second Third of Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>				
1. Measurements										
<u>Length</u>										
10 inches	-	-	-	-	-	<u>X</u>	-	-	-	-
seven feet	-	-	-	-	-	<u>X</u>	-	-	-	-
nine feet	-	-	-	-	-	<u>X</u>	-	-	-	-
25 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
300 feet below sea level	-	-	-	-	-	<u>X</u>	-	-	-	-
500 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
550 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
1050 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
1530 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
5000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
14,000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
60,000; 3000 yards	-	-	-	-	-	<u>X</u>	-	-	-	-
2½ miles	-	-	-	-	-	<u>X</u>	-	-	-	-
52 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
85 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
100 miles in diameter	-	-	-	-	-	-	-	-	-	<u>X</u>
118 miles	-	-	-	-	-	<u>X</u>	-	-	-	-

TABLE V CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Second Third of Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>				
140 miles	-	-	-	-	X	-	-	-	-	-
200 miles	-	-	-	-	X	-	-	-	-	-
220 miles	-	-	-	-	X	-	-	-	-	-
400 miles	-	-	-	-	X	-	-	-	-	-
800 miles	-	-	-	-	X	-	-	-	-	-
1000 miles	-	-	-	-	X	-	-	-	-	-
3478 miles	-	-	-	-	X	-	-	-	-	-
<u>Area and Volume</u>										
60 by 200 miles	-	-	-	-	X	-	-	-	-	-
160 acres	-	-	-	-	-	-	-	-	-	X
376 Acres	-	-	-	-	-	-	-	-	-	X
5000 acres	-	-	-	-	-	-	-	-	-	X
10,000 acres	-	-	-	-	-	-	-	-	-	X
20,000 acres	-	-	-	-	-	-	-	-	-	X
25,000 acres	-	-	-	-	-	-	-	-	-	X
66,000 acres	-	-	-	-	-	-	-	-	-	X
400,000 acres	-	-	-	-	-	-	-	-	-	X
1,200,000 acres	-	-	-	-	-	-	-	-	-	X
300 million cubic miles	-	-	-	-	-	-	-	-	-	X
<u>Weight</u>										
four-pound chicken	-	-	-	-	X	-	-	-	-	-
100 pounds per capita	-	-	-	-	-	-	-	-	-	X
38,000 pounds	-	-	-	-	X	-	-	-	-	-

TABLE V CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u>										<u>Not Taught</u> <u>Before Needed</u>	
	<u>Before</u>	<u>Second</u>	<u>Third</u>	<u>of</u>	<u>Grade</u>	<u>5</u>						
1764	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1777	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1790	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1820	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1823	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1830	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1860	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1864	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1890	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1900	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1908	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1916	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1920	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1922	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1946	-	-	-	-	-	-	-	-	-	-	-	<u>X</u>
<u>Temperature</u>												
40 degrees	-	-	-	-	-	-	<u>X</u>	-	-	-	-	-
45 degrees	-	-	-	-	-	-	<u>X</u>	-	-	-	-	-
75 degrees	-	-	-	-	-	-	<u>X</u>	-	-	-	-	-
120 degrees	-	-	-	-	-	-	<u>X</u>	-	-	-	-	-
20 degrees below zero	-	-	-	-	-	-	<u>X</u>	-	-	-	-	-
<u>Rainfall</u>												
20 inches of rainfall	-	-	-	-	-	-	<u>X</u>	-	-	-	-	-

TABLE V CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u>					<u>Not Taught</u>				
	<u>Before</u>	<u>Second</u>	<u>Third</u>	<u>of</u>	<u>Grade 5</u>	<u>Before</u>	<u>Needed</u>			
36 inches of rainfall	-	-	-	X	-	-	-	-	-	-
60 inches of rainfall	-	-	-	X	-	-	-	-	-	-
<u>Latitude and Longitude</u>										
44th degree of latitude	-	-	-	-	-	-	-	-	-	X
2. Enumerations										
<u>People, Animals, Things</u>										
3000 people	-	-	-	X	-	-	-	-	-	-
6000 people	-	-	-	X	-	-	-	-	-	-
24,000 people	-	-	-	X	-	-	-	-	-	-
45,000 people	-	-	-	X	-	-	-	-	-	-
160,000 families	-	-	-	X	-	-	-	-	-	-
500,000 French people	-	-	-	X	-	-	-	-	-	-
one-half million people	-	-	-	-	-	-	-	-	-	X
two million people	-	-	-	X	-	-	-	-	-	-
3,400,000 passengers	-	-	-	X	-	-	-	-	-	-
fifteen million people	-	-	-	X	-	-	-	-	-	-
2000 persons per square mile	-	-	-	-	-	-	-	-	-	X
16 $\frac{1}{2}$ thousand persons per square mile	-	-	-	-	-	-	-	-	-	X
63,333 hogs	-	-	-	X	-	-	-	-	-	-
a million muskrats	-	-	-	X	-	-	-	-	-	-
26 dams	-	-	-	X	-	-	-	-	-	-
forty mills	-	-	-	X	-	-	-	-	-	-
51 mountain peaks	-	-	-	X	-	-	-	-	-	-

TABLE V CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u>					<u>Not Taught</u>				
	<u>Before</u>	<u>Second</u>	<u>Third</u>	<u>of</u>	<u>Grade 5</u>	<u>Before</u>	<u>Needed</u>			
500 factories	-	-	-	-	X	-	-	-	-	-
600 summer camps	-	-	-	-	X	-	-	-	-	-
800 lumber camps	-	-	-	-	X	-	-	-	-	-
2500 looms	-	-	-	-	X	-	-	-	-	-
2184 steamers	-	-	-	-	X	-	-	-	-	-
4000 islands	-	-	-	-	X	-	-	-	-	-
10,000 railroad cars	-	-	-	-	X	-	-	-	-	-
10,000 stores	-	-	-	-	X	-	-	-	-	-
10,000 lakes	-	-	-	-	X	-	-	-	-	-
12,000 cars	-	-	-	-	X	-	-	-	-	-
22,000 carloads	-	-	-	-	X	-	-	-	-	-
45,000 freight cars	-	-	-	-	X	-	-	-	-	-
1,200,000 autos	-	-	-	-	X	-	-	-	-	-
two million horse power	-	-	-	-	-	-	-	-	-	X
half a dozen	-	-	-	-	X	-	-	-	-	-
a dozen	-	-	-	-	X	-	-	-	-	-
<u>Money</u>										
\$18,000	-	-	-	-	X	-	-	-	-	-
\$126,000	-	-	-	-	X	-	-	-	-	-
200 million dollars	-	-	-	-	X	-	-	-	-	-
3. Fraction Concepts										
<u>Fractions</u>										
one-fourth	-	-	-	-	X	-	-	-	-	-

TABLE VI CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Last Third of Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>				
1350 miles					X					
1500 miles					X					
1800 miles					X					
2091 miles					X					
2100 miles					X					
2500 miles					X					
2600 miles					X					
3337 miles					X					
3394 miles					X					
4420 miles					X					
4685 miles					X					
14,000 miles					X					
<u>Speed</u>										
two feet per second					X					
forty miles an hour					X					
<u>Area and Volume</u>										
a square foot										X
a mile wide and 30 miles long					X					
$1\frac{1}{4}$ miles wide by 1 mile long					X					
8 miles wide and 30 miles long					X					
133 square miles										X
one-half acre										X
two acres										X

TABLE VI CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Last Third of Grade 5</u>										<u>Not Taught</u> <u>Before Needed</u>
2½ acres	-	-	-	-	-	-	-	-	-	-	<u>X</u>
3½ acres for each person in U. S.	-	-	-	-	-	-	-	-	-	-	<u>X</u>
4½ acres	-	-	-	-	-	-	-	-	-	-	<u>X</u>
6 acres	-	-	-	-	-	-	-	-	-	-	<u>X</u>
15 acres	-	-	-	-	-	-	-	-	-	-	<u>X</u>
20 acres	-	-	-	-	-	-	-	-	-	-	<u>X</u>
40 acres	-	-	-	-	-	-	-	-	-	-	<u>X</u>
152,000 acres	-	-	-	-	-	-	-	-	-	-	<u>X</u>
3.7 million acres	-	-	-	-	-	-	-	-	-	-	<u>X</u>
5.2 million acres	-	-	-	-	-	-	-	-	-	-	<u>X</u>
8.9 million acres	-	-	-	-	-	-	-	-	-	-	<u>X</u>
a mile long, a mile wide, 700 feet thick	-	-	-	-	-	<u>X</u>	-	-	-	-	
<u>Weight</u>											
¼ ounce	-	-	-	-	-	<u>X</u>	-	-	-	-	
thirty-pound cabbage	-	-	-	-	-	<u>X</u>	-	-	-	-	
200 pounds	-	-	-	-	-	<u>X</u>	-	-	-	-	
600 pounds	-	-	-	-	-	<u>X</u>	-	-	-	-	
a thousand pounds	-	-	-	-	-	<u>X</u>	-	-	-	-	
a ton	-	-	-	-	-	<u>X</u>	-	-	-	-	
6000 pounds	-	-	-	-	-	<u>X</u>	-	-	-	-	
five tons	-	-	-	-	-	<u>X</u>	-	-	-	-	
nine tons	-	-	-	-	-	<u>X</u>	-	-	-	-	

TABLE VI CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Last Third of Grade 5</u>										<u>Not Taught</u> <u>Before Needed</u>	
80 tons	-	-	-	-	-	-	X	-	-	-	-	-
123 tons	-	-	-	-	-	-	X	-	-	-	-	-
13,000 tons	-	-	-	-	-	-	X	-	-	-	-	-
38,000 tons	-	-	-	-	-	-	X	-	-	-	-	-
66,000 tons	-	-	-	-	-	-	X	-	-	-	-	-
150,000 tons	-	-	-	-	-	-	X	-	-	-	-	-
250,000 tons	-	-	-	-	-	-	X	-	-	-	-	-
800,000 tons	-	-	-	-	-	-	X	-	-	-	-	-
a hundred million pounds	-	-	-	-	-	-	X	-	-	-	-	-
<u>Liquid and Dry Measure</u>												
a hundred barrels of apples	-	-	-	-	-	-	-	-	-	-	-	X
<u>Time</u>												
a minute	-	-	-	-	-	-	X	-	-	-	-	-
thirty minutes	-	-	-	-	-	-	X	-	-	-	-	-
60 hours	-	-	-	-	-	-	X	-	-	-	-	-
day	-	-	-	-	-	-	X	-	-	-	-	-
every other day	-	-	-	-	-	-	X	-	-	-	-	-
tomorrow	-	-	-	-	-	-	X	-	-	-	-	-
daily flights	-	-	-	-	-	-	X	-	-	-	-	-
eight days	-	-	-	-	-	-	X	-	-	-	-	-
8 days	-	-	-	-	-	-	X	-	-	-	-	-
20 days	-	-	-	-	-	-	X	-	-	-	-	-

TABLE VI CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Last Third of Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>				
28 days	-	-	-	-	<u>X</u>	-	-	-	-	-
62 days	-	-	-	-	<u>X</u>	-	-	-	-	-
90 days	-	-	-	-	<u>X</u>	-	-	-	-	-
105 days	-	-	-	-	<u>X</u>	-	-	-	-	-
200 days	-	-	-	-	<u>X</u>	-	-	-	-	-
225 days	-	-	-	-	<u>X</u>	-	-	-	-	-
265 days	-	-	-	-	<u>X</u>	-	-	-	-	-
300 days	-	-	-	-	<u>X</u>	-	-	-	-	-
15 years	-	-	-	-	<u>X</u>	-	-	-	-	-
25 years	-	-	-	-	<u>X</u>	-	-	-	-	-
40 years ago	-	-	-	-	<u>X</u>	-	-	-	-	-
60 years ago	-	-	-	-	<u>X</u>	-	-	-	-	-
70 years ago	-	-	-	-	<u>X</u>	-	-	-	-	-
115 years	-	-	-	-	<u>X</u>	-	-	-	-	-
450 years old	-	-	-	-	<u>X</u>	-	-	-	-	-
600 years old	-	-	-	-	<u>X</u>	-	-	-	-	-
1500 years old	-	-	-	-	<u>X</u>	-	-	-	-	-
3000 years	-	-	-	-	<u>X</u>	-	-	-	-	-
10,000 years	-	-	-	-	<u>X</u>	-	-	-	-	-
decade	-	-	-	-	-	-	-	-	-	<u>X</u>
generations	-	-	-	-	-	-	-	-	-	<u>X</u>
three centuries	-	-	-	-	-	-	-	-	-	<u>X</u>
nineteenth century	-	-	-	-	-	-	-	-	-	<u>X</u>

TABLE VI CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Last Third of Grade 5</u>										<u>Not Taught</u> <u>Before Needed</u>
1898	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1899	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1904	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1914	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1915	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1917	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1927	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1947	-	-	-	-	-	-	-	-	-	-	<u>X</u>
16 hundreds	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1700's	-	-	-	-	-	-	-	-	-	-	<u>X</u>
1800's	-	-	-	-	-	-	-	-	-	-	<u>X</u>
<u>Temperature</u>											
25 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-	-
62 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-	-
85 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-	-
89 degrees F.	-	-	-	-	-	<u>X</u>	-	-	-	-	-
58 degrees below zero	-	-	-	-	-	<u>X</u>	-	-	-	-	-
<u>Rainfall</u>											
an inch of rainfall	-	-	-	-	-	<u>X</u>	-	-	-	-	-
two inches of rainfall	-	-	-	-	-	<u>X</u>	-	-	-	-	-
23 inches of rainfall	-	-	-	-	-	<u>X</u>	-	-	-	-	-
560 inches of rainfall	-	-	-	-	-	<u>X</u>	-	-	-	-	-

TABLE VI CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Last Third of Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>
<u>Latitude and Longitude</u>						
30 degrees north latitude	-	-	-	-	-	<u>X</u>
15 degrees south latitude	-	-	-	-	-	<u>X</u>
158 degrees west longitude	-	-	-	-	-	<u>X</u>
40 degrees	-	-	-	-	-	<u>X</u>
<u>Enumerations</u>						
<u>People, Animals, Things</u>						
35 people	-	-	-	<u>X</u>	-	-
200 people	-	-	-	<u>X</u>	-	-
546 people per square mile	-	-	-	<u>X</u>	-	-
5000 people	-	-	-	<u>X</u>	-	-
9000 people	-	-	-	<u>X</u>	-	-
10,000 people	-	-	-	<u>X</u>	-	-
18,000 people	-	-	-	<u>X</u>	-	-
23,000 people	-	-	-	<u>X</u>	-	-
30,000 people	-	-	-	<u>X</u>	-	-
50,000 persons	-	-	-	<u>X</u>	-	-
a hundred thousand persons	-	-	-	<u>X</u>	-	-
53,000 people	-	-	-	<u>X</u>	-	-
60,000 people	-	-	-	<u>X</u>	-	-
100,000 people	-	-	-	<u>X</u>	-	-
123,000 people	-	-	-	<u>X</u>	-	-
130,000 people	-	-	-	<u>X</u>	-	-

TABLE VI CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Last Third of Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>				
140,000 people	-	-	-	-	X	-	-	-	-	-
150,000 people	-	-	-	-	X	-	-	-	-	-
175,000 people	-	-	-	-	X	-	-	-	-	-
176,000 people	-	-	-	-	X	-	-	-	-	-
180,000 people	-	-	-	-	X	-	-	-	-	-
202,589 people	-	-	-	-	X	-	-	-	-	-
312,710 people	-	-	-	-	X	-	-	-	-	-
515,547 people	-	-	-	-	X	-	-	-	-	-
six hundred thousand people	-	-	-	-	X	-	-	-	-	-
3,400,000 people	-	-	-	-	X	-	-	-	-	-
62 kinds of fish	-	-	-	-	X	-	-	-	-	-
84 calves	-	-	-	-	X	-	-	-	-	-
ten million animals	-	-	-	-	X	-	-	-	-	-
32 state forests	-	-	-	-	X	-	-	-	-	-
35 avacados	-	-	-	-	X	-	-	-	-	-
47 hot springs	-	-	-	-	X	-	-	-	-	-
102 stories high	-	-	-	-	X	-	-	-	-	-
900 airliners	-	-	-	-	X	-	-	-	-	-
1000 plants	-	-	-	-	X	-	-	-	-	-
1200 railroadd cars	-	-	-	-	X	-	-	-	-	-
1900 boats	-	-	-	-	X	-	-	-	-	-
2000 fur farms	-	-	-	-	X	-	-	-	-	-
11,000 varieties	-	-	-	-	X	-	-	-	-	-

TABLE VI CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Last Third of Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>				
20,000 ships	-	-	-	-	X	-	-	-	-	-
22,000 carloads	-	-	-	-	-	-	-	-	-	X
200,000 cans	-	-	-	-	X	-	-	-	-	-
250,000 looms	-	-	-	-	X	-	-	-	-	-
600,000 trees	-	-	-	-	X	-	-	-	-	-
750,000 chemicals	-	-	-	-	X	-	-	-	-	-
one hundred million chickens	-	-	-	-	X	-	-	-	-	-
<u>Money</u>										
three cents an acre	-	-	-	-	-	-	-	-	-	X
six cents a foot	-	-	-	-	X	-	-	-	-	-
fifteen cents a foot	-	-	-	-	X	-	-	-	-	-
two dollars worth of gold	-	-	-	-	X	-	-	-	-	-
\$7.50	-	-	-	-	X	-	-	-	-	-
\$30.	-	-	-	-	X	-	-	-	-	-
\$250,000	-	-	-	-	X	-	-	-	-	-
\$500,000	-	-	-	-	X	-	-	-	-	-
twenty-five million dollars	-	-	-	-	X	-	-	-	-	-
three billion dollars	-	-	-	-	-	-	-	-	-	X
3. Fraction Concept										
<u>Fractions</u>										
one-half	-	-	-	-	X	-	-	-	-	-
one-fifth	-	-	-	-	X	-	-	-	-	-
four-fifths	-	-	-	-	X	-	-	-	-	-
seven-eighths	-	-	-	-	X	-	-	-	-	-

TABLE VI CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Last Third of Grade 5</u>					<u>Not Taught</u> <u>Before Needed</u>	
two-tenths	-	-	-	-	<u>X</u>	-	-
one-fourteenth	-	-	-	-	<u>X</u>	-	-
one-twentieth	-	-	-	-	<u>X</u>	-	-
<u>Per Cents</u>							
50%	-	-	-	-	-	-	<u>X</u>
60%	-	-	-	-	-	-	<u>X</u>
4. Comparative Terms							
twenty-eighth	-	-	-	-	<u>X</u>	-	-
three times as large as	-	-	-	-	<u>X</u>	-	-
one out of nine	-	-	-	-	<u>X</u>	-	-
four out of five	-	-	-	-	<u>X</u>	-	-
seven out of ten	-	-	-	-	<u>X</u>	-	-
14 out of 17	-	-	-	-	<u>X</u>	-	-
85 out of 100	-	-	-	-	<u>X</u>	-	-
80 oranges per person	-	-	-	-	<u>X</u>	-	-
death rate of 14 per 100	-	-	-	-	<u>X</u>	-	-
death rate of 28 per 1000	-	-	-	-	<u>X</u>	-	-

TABLE VII

READINESS PROVIDED BY ARITHMETIC SERIES FOR DEFINITE
QUANTITATIVE TERMS INCLUDED IN FIRST THIRD OF GRADE 7 GEOGRAPHY

<u>Terms</u> <u>In Geography</u>						<u>Taught in Arithmetic</u> <u>Before Grade 7</u>						<u>Not Taught</u> <u>Before Needed</u>
1. Measurements												
<u>Length</u>												
twelve miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
15 miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
40 miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
75 miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
one hundred miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
150 miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
300 miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
400 miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
600 miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
a thousand miles	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
<u>Area and Volume</u>												
fifteen acres	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
thirty acres	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
sixty acres	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
a thousand acres	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
<u>Weight</u>												
100,000 tons	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-
<u>Time</u>												
five minutes	-	-	-	-	-	<u>X</u>	-	-	-	-	-	-

TABLE VII CONTINUED

<u>In</u>	<u>Terms</u> <u>Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 7</u>					<u>Not Taught</u> <u>Before Needed</u>				
	ten minutes	-	-	-	-	X	-	-	-	-	-
	sixteen hours	-	-	-	-	X	-	-	-	-	-
	sixty hours	-	-	-	-	X	-	-	-	-	-
	5 o'clock	-	-	-	-	X	-	-	-	-	-
	6 o'clock	-	-	-	-	X	-	-	-	-	-
	tomorrow	-	-	-	-	X	-	-	-	-	-
	nine days	-	-	-	-	X	-	-	-	-	-
	seventy days	-	-	-	-	X	-	-	-	-	-
	four years	-	-	-	-	X	-	-	-	-	-
	12 years old	-	-	-	-	X	-	-	-	-	-
	14 years old	-	-	-	-	X	-	-	-	-	-
	16 years old	-	-	-	-	X	-	-	-	-	-
	17 years old	-	-	-	-	X	-	-	-	-	-
	19 years old	-	-	-	-	X	-	-	-	-	-
	twenty years ago	-	-	-	-	X	-	-	-	-	-
	eighty years ago	-	-	-	-	X	-	-	-	-	-
	150 years ago	-	-	-	-	X	-	-	-	-	-
	200 years ago	-	-	-	-	X	-	-	-	-	-
	400 years ago	-	-	-	-	X	-	-	-	-	-
	600 years ago	-	-	-	-	X	-	-	-	-	-
	1400 years ago	-	-	-	-	X	-	-	-	-	-
	2000 years ago	-	-	-	-	X	-	-	-	-	-
	982	-	-	-	-	X	-	-	-	-	-

TABLE VII CONTINUED

<u>Terms</u> In <u>Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 7</u>										<u>Not Taught</u> <u>Before Needed</u>	
1492	-	-	-	-	-	-	-	-	-	-	-	X
1497	-	-	-	-	-	-	-	-	-	-	-	X
1497-98	-	-	-	-	-	-	-	-	-	-	-	X
1871	-	-	-	-	-	-	-	-	-	-	-	X
1914	-	-	-	-	-	-	-	-	-	-	-	X
2. Enumerations												
<u>People, Animals, Things</u>												
two hundred people	-	-	-	-	-	-	X	-	-	-	-	-
500 people per square mile	-	-	-	-	-	-	X	-	-	-	-	-
700 people per square mile	-	-	-	-	-	-	X	-	-	-	-	-
3000 people	-	-	-	-	-	-	X	-	-	-	-	-
a million people	-	-	-	-	-	-	X	-	-	-	-	-
3,000,000 people	-	-	-	-	-	-	X	-	-	-	-	-
4,000,000 people	-	-	-	-	-	-	X	-	-	-	-	-
7,500,000 people	-	-	-	-	-	-	X	-	-	-	-	-
ten million people	-	-	-	-	-	-	X	-	-	-	-	-
10,300,000 people	-	-	-	-	-	-	X	-	-	-	-	-
11,700,000 people	-	-	-	-	-	-	X	-	-	-	-	-
12,000,000 Germans	-	-	-	-	-	-	X	-	-	-	-	-
20,000,000 people	-	-	-	-	-	-	X	-	-	-	-	-
50,000,000 people	-	-	-	-	-	-	X	-	-	-	-	-
70,000,000 people	-	-	-	-	-	-	X	-	-	-	-	-
80,000,000 people	-	-	-	-	-	-	X	-	-	-	-	-

TABLE VII CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 7</u>					<u>Not Taught</u> <u>Before Needed</u>				
150,000,000 people	-	-	-	-	<u>X</u>	-	-	-	-	-
200 million people	-	-	-	-	<u>X</u>	-	-	-	-	-
300,000,000 people	-	-	-	-	<u>X</u>	-	-	-	-	-
one million animals	-	-	-	-	<u>X</u>	-	-	-	-	-
fifty-two nations	-	-	-	-	<u>X</u>	-	-	-	-	-
sixty nations	-	-	-	-	<u>X</u>	-	-	-	-	-
a hundred towns	-	-	-	-	<u>X</u>	-	-	-	-	-
175 nationalities	-	-	-	-	<u>X</u>	-	-	-	-	-
10,000 planes	-	-	-	-	<u>X</u>	-	-	-	-	-
<u>Money</u>										
fifty cents	-	-	-	-	<u>X</u>	-	-	-	-	-
3. Fraction Concepts										
<u>Fractions</u>										
half	-	-	-	-	<u>X</u>	-	-	-	-	-
one-half	-	-	-	-	<u>X</u>	-	-	-	-	-
one-third	-	-	-	-	<u>X</u>	-	-	-	-	-
two-thirds	-	-	-	-	<u>X</u>	-	-	-	-	-
one-fourth	-	-	-	-	<u>X</u>	-	-	-	-	-
three-fourths	-	-	-	-	<u>X</u>	-	-	-	-	-
one-fifth	-	-	-	-	<u>X</u>	-	-	-	-	-
three-fifths	-	-	-	-	<u>X</u>	-	-	-	-	-
one-tenth	-	-	-	-	<u>X</u>	-	-	-	-	-

TABLE VII CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Grade 7</u>					<u>Not Taught</u> <u>Before Needed</u>				
4. Comparative Terms										
twice as many as	-	-	-	-	<u>X</u>	-	-	-	-	-
twice as large as	-	-	-	-	<u>X</u>	-	-	-	-	-
four times as big as	-	-	-	-	<u>X</u>	-	-	-	-	-
six times as much as	-	-	-	-	<u>X</u>	-	-	-	-	-
eight times as many as	-	-	-	-	<u>X</u>	-	-	-	-	-

TABLE VIII

READINESS PROVIDED BY ARITHMETIC SERIES FOR DEFINITE
QUANTITATIVE TERMS INCLUDED IN SECOND THIRD OF GRADE 7 GEOGRAPHY

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Second Third of Grade 7</u>					<u>Not Taught</u> <u>Before Needed</u>				
1. Measurements										
<u>Length</u>										
three feet	-	-	-	-	-	<u>X</u>	-	-	-	-
17 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
150 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
200 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
5000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
8000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
five miles	-	-	-	-	-	<u>X</u>	-	-	-	-
35 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
60 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
200 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
800 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
1500 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
2200 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
3870 mile-long	-	-	-	-	-	<u>X</u>	-	-	-	-
<u>Area and Volume</u>										
one acre	-	-	-	-	-	<u>X</u>	-	-	-	-
per acre	-	-	-	-	-	<u>X</u>	-	-	-	-

TABLE VIII CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Second Third of Grade 7</u>							<u>Not Taught</u> <u>Before Needed</u>	
two hours	-	-	-	-	-	X	-	-	-
nine o'clock	-	-	-	-	-	X	-	-	-
day	-	-	-	-	-	X	-	-	-
forty days	-	-	-	-	-	X	-	-	-
ten weeks	-	-	-	-	-	X	-	-	-
a year	-	-	-	-	-	X	-	-	-
three years old	-	-	-	-	-	X	-	-	-
eight years old	-	-	-	-	-	X	-	-	-
forty years old	-	-	-	-	-	X	-	-	-
50 years ago	-	-	-	-	-	X	-	-	-
100 years ago	-	-	-	-	-	X	-	-	-
1000 years	-	-	-	-	-	X	-	-	-
1500 years	-	-	-	-	-	X	-	-	-
2500 years	-	-	-	-	-	X	-	-	-
3000 years	-	-	-	-	-	X	-	-	-
4000 years	-	-	-	-	-	X	-	-	-
5000 years	-	-	-	-	-	X	-	-	-
6000 years	-	-	-	-	-	X	-	-	-
century	-	-	-	-	-	-	-	-	X
1917	-	-	-	-	-	-	-	-	X
1947	-	-	-	-	-	-	-	-	X
<u>Latitude and Longitude</u>									
30th parallel of latitude	-	-	-	-	-	-	-	-	X

TABLE VIII CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u>					<u>Not Taught</u>		
	<u>Before</u>	<u>Second</u>	<u>Third</u>	<u>of Grade</u>	<u>7</u>	<u>Before</u>	<u>Needed</u>	
40 degrees north latitude	-	-	-	-	-	-	-	X
2. Enumerations								
<u>People, Animals, Things</u>								
30 women	-	-	-	-	X	-	-	-
400 people	-	-	-	-	X	-	-	-
1000 people per square mile	-	-	-	-	X	-	-	-
2500 people	-	-	-	-	X	-	-	-
25,000 people	-	-	-	-	X	-	-	-
100,000 people	-	-	-	-	X	-	-	-
150,000 people	-	-	-	-	X	-	-	-
700,000 people	-	-	-	-	X	-	-	-
14,000,000 Negroes	-	-	-	-	X	-	-	-
17,000,000 people	-	-	-	-	X	-	-	-
47,000,000 people	-	-	-	-	X	-	-	-
700,000,000 people	-	-	-	-	X	-	-	-
a half-million people	-	-	-	-	X	-	-	-
80 families	-	-	-	-	X	-	-	-
140 villages	-	-	-	-	X	-	-	-
32,000 roses	-	-	-	-	X	-	-	-
<u>Money</u>								
twenty-three cents	-	-	-	-	X	-	-	-
\$20 a month	-	-	-	-	X	-	-	-
3. Fraction Concepts								
<u>Fractions</u>								

TABLE VIII CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before Second Third of Grade 7</u>					<u>Not Taught</u> <u>Before Needed</u>				
halfway point	-	-	-	-	<u>X</u>	-	-	-	-	-
one sixth	-	-	-	-	<u>X</u>	-	-	-	-	-
two-fifths	-	-	-	-	<u>X</u>	-	-	-	-	-
four-fifths	-	-	-	-	<u>X</u>	-	-	-	-	-
five-sixths	-	-	-	-	<u>X</u>	-	-	-	-	-
one-eighth	-	-	-	-	<u>X</u>	-	-	-	-	-
nine-tenths	-	-	-	-	<u>X</u>	-	-	-	-	-
4. Comparative Terms										
ten times as much as	-	-	-	-	<u>X</u>	-	-	-	-	-
ten times as many as	-	-	-	-	<u>X</u>	-	-	-	-	-
ten times as long as	-	-	-	-	<u>X</u>	-	-	-	-	-

TABLE IX

READINESS PROVIDED BY ARITHMETIC SERIES FOR DEFINITE
QUANTITATIVE TERMS INCLUDED IN THE LAST THIRD OF GRADE 7 GEOGRAPHY

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before the Last Third of Grade 7</u>					<u>Not Taught</u> <u>Before Needed</u>				
1. Measurements										
<u>Length</u>										
12 inches	-	-	-	-	-	<u>X</u>	-	-	-	-
four feet	-	-	-	-	-	<u>X</u>	-	-	-	-
20 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
100 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
500 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
12,000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
16,000 feet	-	-	-	-	-	<u>X</u>	-	-	-	-
6½ miles	-	-	-	-	-	<u>X</u>	-	-	-	-
1¼ miles	-	-	-	-	-	<u>X</u>	-	-	-	-
50 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
ninety miles	-	-	-	-	-	<u>X</u>	-	-	-	-
120 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
140 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
350 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
700 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
1200 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
1400 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
2000 miles	-	-	-	-	-	<u>X</u>	-	-	-	-
4000 miles	-	-	-	-	-	<u>X</u>	-	-	-	-

TABLE IX CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before the Last Third of Grade 7</u>					<u>Not Taught</u> <u>Before Needed</u>				
<u>Speed</u>										
40 miles an hour	-	-	-	-	X	-	-	-	-	-
<u>Area and Volume</u>										
two acres	-	-	-	-	X	-	-	-	-	-
four acres	-	-	-	-	X	-	-	-	-	-
3400 acre ranch	-	-	-	-	X	-	-	-	-	-
three million acres	-	-	-	-	X	-	-	-	-	-
15 million acres	-	-	-	-	X	-	-	-	-	-
640 acres in a square mile	-	-	-	-	X	-	-	-	-	-
a square mile	-	-	-	-	X	-	-	-	-	-
150 square miles	-	-	-	-	X	-	-	-	-	-
5000 square miles	-	-	-	-	X	-	-	-	-	-
four million square miles	-	-	-	-	X	-	-	-	-	-
6435 square miles	-	-	-	-	X	-	-	-	-	-
<u>Weight</u>										
7½ pounds	-	-	-	-	X	-	-	-	-	-
twenty pounds	-	-	-	-	X	-	-	-	-	-
a million tons	-	-	-	-	X	-	-	-	-	-
<u>Liquid and Dry Measures</u>										
3½ pints	-	-	-	-	X	-	-	-	-	-
<u>Temperature</u>										
40 degrees F.	-	-	-	-	X	-	-	-	-	-
90 degrees F.	-	-	-	-	X	-	-	-	-	-
100 degrees F.	-	-	-	-	X	-	-	-	-	-

TABLE IX CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before the Last Third of Grade 7</u>							<u>Not Taught</u> <u>Before Needed</u>	
1770	-	-	-	-	-	-	-	-	<u>X</u>
1870	-	-	-	-	-	-	-	-	<u>X</u>
1853	-	-	-	-	-	-	-	-	<u>X</u>
1900	-	-	-	-	-	-	-	-	<u>X</u>
1937	-	-	-	-	-	-	-	-	<u>X</u>
1942	-	-	-	-	-	-	-	-	<u>X</u>
December 7, 1941	-	-	-	-	-	-	-	-	<u>X</u>
July 4, 1946	-	-	-	-	-	-	-	-	<u>X</u>
1948	-	-	-	-	-	-	-	-	<u>X</u>
<u>Rainfall</u>									
15 inches of rainfall	-	-	-	-	<u>X</u>	-	-	-	-
20 inches of rainfall	-	-	-	-	<u>X</u>	-	-	-	-
100 inches of rainfall	-	-	-	-	<u>X</u>	-	-	-	-
200 inches of rainfall	-	-	-	-	<u>X</u>	-	-	-	-
2. Enumerations									
<u>People, Animals, Things</u>									
ten people per square mile	-	-	-	-	<u>X</u>	-	-	-	-
eighteen lives	-	-	-	-	<u>X</u>	-	-	-	-
150 people per square mile	-	-	-	-	<u>X</u>	-	-	-	-
700 people	-	-	-	-	<u>X</u>	-	-	-	-
1000 people	-	-	-	-	<u>X</u>	-	-	-	-
4000 people	-	-	-	-	<u>X</u>	-	-	-	-
6434 people per square mile	-	-	-	-	<u>X</u>	-	-	-	-

TABLE IX CONTINUED

<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before the Last Third of Grade 7</u>					<u>Not Taught</u> <u>Before Needed</u>				
15,000 people	-	-	-	-	X	-	-	-	-	-
20,000 people	-	-	-	-	X	-	-	-	-	-
25,000 people	-	-	-	-	X	-	-	-	-	-
25,000 people per square mile	-	-	-	-	X	-	-	-	-	-
30,000 white people	-	-	-	-	X	-	-	-	-	-
50,000 people	-	-	-	-	X	-	-	-	-	-
52,000 people	-	-	-	-	X	-	-	-	-	-
265,000 people	-	-	-	-	X	-	-	-	-	-
300,000 Moslems	-	-	-	-	X	-	-	-	-	-
3,000,000 Germans	-	-	-	-	X	-	-	-	-	-
4 million people	-	-	-	-	X	-	-	-	-	-
15 million people	-	-	-	-	X	-	-	-	-	-
27,000,000 people	-	-	-	-	X	-	-	-	-	-
80 million people	-	-	-	-	X	-	-	-	-	-
200,000,000 people	-	-	-	-	X	-	-	-	-	-
one-half billion people	-	-	-	-	X	-	-	-	-	-
330 billion people	-	-	-	-	X	-	-	-	-	-
a thousand cows for every four square miles	-	-	-	-	X	-	-	-	-	-
16 cities	-	-	-	-	X	-	-	-	-	-
25 houses	-	-	-	-	X	-	-	-	-	-
87 languages	-	-	-	-	X	-	-	-	-	-
200 trees	-	-	-	-	X	-	-	-	-	-

TABLE IX CONTINUED

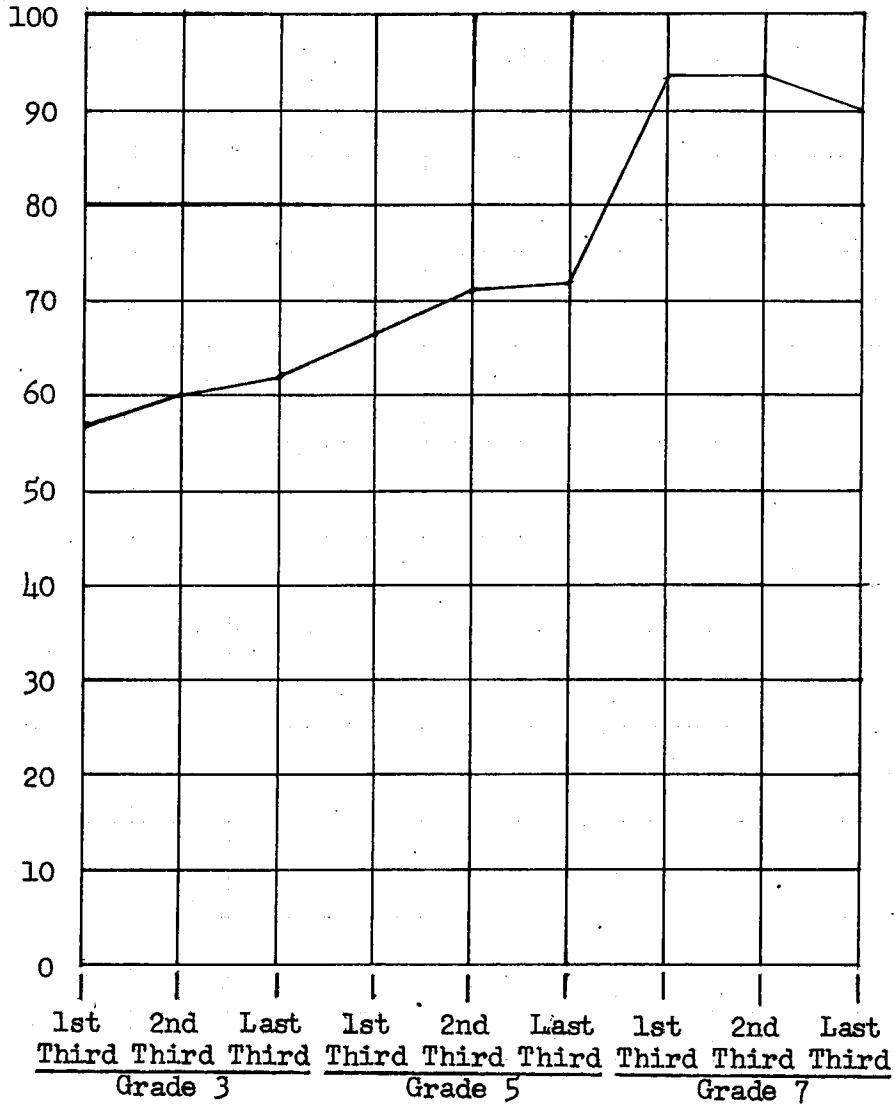
<u>Terms</u> <u>In Geography</u>	<u>Taught in Arithmetic</u> <u>Before the Last Third of Grade 7</u>							<u>Not Taught</u> <u>Before Needed</u>				
250 languages	-	-	-	-	-	X	-	-	-	-	-	-
7000 islands	-	-	-	-	-	X	-	-	-	-	-	-
3. Fraction Concepts												
<u>Fractions</u>												
one-sixth	-	-	-	-	-	X	-	-	-	-	-	-
one-seventh	-	-	-	-	-	X	-	-	-	-	-	-
one-twentieth	-	-	-	-	-	X	-	-	-	-	-	-
<u>Per cents</u>												
twenty per cent	-	-	-	-	-	X	-	-	-	-	-	-
ninety-five per cent	-	-	-	-	-	X	-	-	-	-	-	-
ninety-six per cent	-	-	-	-	-	X	-	-	-	-	-	-
4. Comparative Terms												
twenty times as many as	-	-	-	-	-	X	-	-	-	-	-	-
three out of every four	-	-	-	-	-	X	-	-	-	-	-	-
one for each five	-	-	-	-	-	X	-	-	-	-	-	-
one out of eighteen	-	-	-	-	-	X	-	-	-	-	-	-
one out of twenty	-	-	-	-	-	X	-	-	-	-	-	-
third most important	-	-	-	-	-	X	-	-	-	-	-	-

TABLE X

TOTALS AND PERCENTAGES OF READINESS OF EACH OF THE NINE TABLES

Number of Table	Number Different Quantitative Items	Number Items Provided Readiness	Number Items No Readiness	Percentage of Readiness
I	63	36	27	57%
II	35	21	14	60%
III	29	18	11	62%
IV	264	178	86	67%
V	143	102	41	71%
VI	225	162	63	72%
VII	84	79	5	94%
VIII	86	81	5	94%
IX	117	106	11	90%
Totals	1046	783	263	75%

Per Cent
Scale



PER CENT OF READINESS GIVEN IN AN ARITHMETIC SERIES
FOR AN UNDERSTANDING OF THE DEFINITE QUANTITATIVE CONCEPTS USED IN
GRADES 3, 5, AND 7 OF A GEOGRAPHY SERIES BY
THIRDS FOR EACH GEOGRAPHY BOOK

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary. The purpose of this investigation was to see how much readiness was given in an arithmetic series for understanding the quantitative concepts in a geography series. The geography books for grades three, five and seven were used as a sampling of the series. Only the different definite quantitative items were used in this study. The findings in this comparison are restated and summarized in the following paragraphs.

The third grade book contained 127 different definite quantitative terms. The readiness given for this grade was 59%. The large areas for which no readiness was given were: square measure, money larger than fifty cents, numbers as high as millions, twenty times as big as, acres, miles and pounds.

The fifth grade contained by far the largest number of different definite quantitative terms. There were 632 terms, or more than twice as many as in the seventh grade book. The readiness given for the fifth grade was 70%. The large areas in this grade for which no readiness was given were: areas and volumes, large numbers into the billions, dates, degrees, latitude and longitude, per cents, and acres.

The seventh grade book contained 287 different definite quantitative terms. The readiness given for this grade was 93% which was by far the best of the three grades under study. The item with the least readiness

was the understanding of dates.

The total terms checked for all three grades was 1046. A readiness was given for 783 terms or 75% of them. One different definite quantitative term out of every four may not be understood in this particular series when arithmetic is taught from the series used in this study.

The graph in the preceding chapter indicates that there was no substantial gain in readiness between grades three and five, but a very good increase between grades five and seven.

Conclusions. This study seemed to warrant the following conclusions:

1. Quantitative terms beyond the readiness of children are used too frequently in geography books, especially in the earlier grades of this study.
2. Special effort should be made by every geography teacher in the elementary grades to make clear, if possible, any quantitative terms that are not understood by the pupils.
3. A more thorough teaching of meaningful arithmetic would be helpful in the understanding of the social studies.
4. Geography textbook writers should familiarize themselves with the quantitative concepts understood by children at the various levels and choose a vocabulary within those limits.

Suggestions for further study. The different definite quantitative terms used for the comparison in this study were only a part, no doubt less than half, of the different quantitative terms in the same books. A similar analysis of the indefinite quantitative terms would be valuable.

Another project that would prove helpful in the light of this study would be an investigation of the quantitative terms in three or four

geography books of the fifth grade level, by several different authors of geography texts.

A similar study of the geography books for grades four and six of this same series would show a comparison in readiness with the other books of the series and would be beneficial to teachers and authors.

GRADED TEXTBOOKS USED IN STUDY

Geographies

Smith, J. Russell, and Frank E. Sorenson, Our Neighbors at Home, Grade 3, Philadelphia: The John C. Winston Company, 1947. 250 pp.

Smith, J. Russell, and Frank E. Sorenson, Neighbors in the United States and Canada, Grade 5 Philadelphia: The John C. Winston Company, 1951 350 pp.

Carls, Norman, and Frank Sorenson, Neighbors Across the Seas, Grade 7. Philadelphia: The John C. Winston Company, 1950. 392 pp.

Arithmetics

Stuebaker, J. W. and others, Study Arithmetics, Book 3. Chicago: Scott, Foresman and Company, 1947. 352 pp.

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Knight, F. B., J. W. Stuebaker, and G. M. Ruch, Study Arithmetics, Book 5. Chicago: Scott, Foresman and Company, 1948. 352 pp.

Knight, F. B., J. W. Stuebaker, and G. M. Ruch, Study Arithmetics, Book 6. Chicago: Scott, Foresman and Company, 1948, 448 pp.

Knight, F. B., J. W. Stuebaker, and Gladys Tate, Study Arithmetics, Book 7. Chicago: Scott, Foresman and Company, 1948. 480 pp.

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