

1945

# Multiple meanings of words in arithmetic textbooks

Audrey Ann Simmons

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WASHINGTON UNIVERSITY  
Department of Education

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MULTIPLE MEANINGS OF WORDS IN ARITHMETIC TEXTBOOKS

by

Audrey Ann Simmons

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A dissertation presented to the Board  
of Graduate Studies of Washington  
University in partial fulfilment  
of the requirements for the  
degree of Master of Science  
in Education

June, 1945

Saint Louis, Missouri

## TABLE OF CONTENTS

CHAPTER	PAGE
I. HISTORY. . . . .	1
II. PROCEDURE. . . . .	9
III. INTERPRETATION OF DATA. . . . .	13
IV. CONCLUSIONS AND RECOMMENDATIONS. . . . .	18

## LIST OF TABLES

Table	page
1. Words That Recur in Twelve Arithmetic Textbooks and The Total Number of Different Meanings for Each. . . . .	21
2. Number of Words That Recur in Each of the Twelve Arithmetic Textbooks and the Total Number of Meanings. . . . .	24
3. Recurring Words and Multiple Meanings in Four Series of Arithmetics, Grades IV, V, VI . . . . .	25
BIBLIOGRAPHY. . . . .	113

## CHAPTER I

### HISTORY

The subject of arithmetic deals with two distinct types of work, (1) the mechanics of arithmetic and (2) concrete problems. These are recognized as so different that, in standardized tests, two separate tests in arithmetic are given, one for Arithmetic Computation and the other for Arithmetic Reasoning. Because of the findings of many scientific studies,<sup>1</sup> resulting in improved methods and in more efficient teaching of the mechanics, much of the difficulty in this branch of the subject has been eliminated, both for hearing and for deaf children. However, regarding the difficulties of concrete arithmetic problems expressed in language, much is yet to be learned.

In the field of problem solving, that is, of language problems, diagnostic studies have revealed possible causes of difficulty in this important area of learning to be reading and language. That improvement in ability to read may result in improvement in ability to solve arithmetic was shown by Lessenger.<sup>2</sup> This fact was emphasized by Guy Wilson,

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<sup>1</sup> Monroe, Walter S. and Max D. Engelhart, A Critical Summary of Research Relating to the Teaching of Arithmetic, Bulletin No. 58, Bureau of Educational Research, College of Education, Urbana, Ill., University of Illinois, 1931, 115p.

<sup>2</sup> Lessenger, W. E., "Reading Difficulties in Arithmetic Computation," Journal of Educational Research, 11:287-291, April, 1925.

also, who said:

. . . Training in reading will improve the arithmetic work.<sup>3</sup>

<sup>4</sup>Thorndike claimed in one of his early studies that difficulty in the solution of problems is more frequently due to the language of the problem than to the arithmetic involved. At a later date he stated:

The understanding of certain words is necessary in arithmetic as truly as is the understanding of numbers themselves.<sup>5</sup>

That difficulties were encountered in arithmetic because of lack of vocabulary understanding was early shown by Chase.<sup>6</sup> Her study was an attempt to determine sources of waste and of obstructions in this subject. Tables, compiled from results of tests and from teachers' testimony illustrated the very meager concepts pupils had of many of the terms which occurred in arithmetic problems. Buswell and John, to show that vocabulary understanding is essential for progress in

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<sup>3</sup>Wilson, G. M., Mildred B. Stone, and Charles O. Dalrymple, Teaching the New Arithmetic. New York: McGraw-Hill Book Company, Inc., 1939, p.300.

<sup>4</sup>Thorndike, E. L., "The Measurement of Educational Products," School Review, 20: 289, 299, May, 1912.

<sup>5</sup>Thorndike, E. L., Psychology of Arithmetic, New York: Macmillan Co., 1922, p. 8.

<sup>6</sup>Chase, Sara E., "Waste in Arithmetic," Teachers' College Record, 18: 260 - 70, September, 1917.

arithmetic had this to say:

Until pupils' concepts in arithmetic are as clear as their concepts on the playground there is little reason to expect that the abilities of pupils will go far beyond computational arithmetic.<sup>7</sup>

<sup>8</sup>  
Kramer, as a result of a study to determine the effect of four factors, (1) sentence form of the problem, (2) vocabulary of the problem, (3) style of the problem, and (4) problem situation, on children's success in problem solving, concluded that none of the factors made any appreciable difference except that of unfamiliar vocabulary. Treacy,<sup>9</sup> from his findings concluded that the need for stressing the meanings of terms, general and mathematical, as an approach to improving pupils' ability in problem solving was evident.

Investigations dealing with the special vocabulary of arithmetic have been relatively numerous during the past two decades. Ava Hunt's<sup>10</sup> analysis of six third-grade arithmetic textbooks showed that the technical or mathematical

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<sup>7</sup>  
Buswell, G. T., and Lenore John, Vocabulary of Arithmetic, Supplementary Educational Monograph, No. 38, Chicago, Ill.: University of Chicago Press, 1925, p.104.

<sup>8</sup>  
Kramer, Grace A., "The Effect of Certain Factors in the Verbal Arithmetic Problem upon Children's Success in the Solution," The Johns Hopkins University Studies in Education, No. 20, Baltimore: The Johns Hopkins Press, 1933, 106p.

<sup>9</sup>  
Treacy, John P., "The Relationship of Reading Skills to the Ability to Solve Arithmetic Problems," Journal of Educational Research, 38: 86-88, October, 1944.

<sup>10</sup>  
Hunt, Ava Farwell, "A Comparison of the Vocabularies of Third-Grade Textbooks in Arithmetic and Reading," Unpublished Master's thesis, Department of Education, University of Chicago, 1926, 88p.

vocabulary consisted of 10.2 percent of the total vocabulary<sup>11</sup> in the six books. A similar study by Heightshoe<sup>11</sup> ascertained the extent to which authors agreed on word lists suitable for children of second and third grades and compared the vocabularies of arithmetic textbooks with readers on the same levels. She found 485 words which did not appear in any reading text, indicating the need for specific teaching of vocabulary in the arithmetic period.

More detailed work was done by Brooks<sup>12</sup> who listed the arithmetical terms found in five series of arithmetics for five grades. The vocabulary in these lists is entirely technical in nature, falling into twelve classifications such as, size, money, quantity, value, measurement, etcetera. It is noted that Brooks is the only investigator to have considered that some words in the technical vocabulary had more than one meaning as cost, the noun, and cost, the verb. More emphasis on the teaching of the vocabulary of arithmetic

was advocated by Gray,<sup>13</sup> who reported an experiment in which special training in vocabulary of arithmetic problems was

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11

Heightshoe, Agnes Ethel, "A Comparison of the Vocabularies of Arithmetics and Readers of the Second and Third Grades," unpublished Master's thesis, Department of Education, University of Chicago, 1928, 148p.

12

Brooks, Samuel S., "A Study of the Technical and Semi-technical Vocabulary of Arithmetic," unpublished Master's thesis, Ohio State University, 1926.

13

Gray, Olive, "Teaching Pupils to Read Arithmetic and Other Subject Matter," Elementary School Journal, 26:607-618 April, 1926.

stressed. Included in the report are five lists of words and phrases which the pupils should understand. A plan for securing understanding is given.

The investigators quoted above worked on the basis of frequency of use alone, with no attention to the importance of the words. Pressey and Elam<sup>14</sup> summarized the studies of frequency of use and determined, with the help of teachers, the concepts of utmost importance in elementary school arithmetic. This is probably the best known list of arithmetical terms for the eight grades. This list contains 117 technical and 148 non-technical terms essential to success in arithmetic. No mention is made whatsoever concerning the multiple use of many of the words. For example, Pressey lists point once, whereas it has at least five meanings. This word could mean a sharp end, a coupon, as a ration point, a mark as a decimal point, a verb, or a unit in scoring.

That multiple meanings such as occur for the word point, mentioned above, are real stumbling blocks for children has been indicated by a few investigators. Among them was Dolch who felt that:

The fundamental . . . problem involved in language is the problem of word meanings. <sup>15</sup>

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14

Pressey, L. C., and M.K. Elam, "Fundamental Vocabulary of Elementary School Arithmetic," Elementary School Journal, 33:45-50, September, 1932.

15

Dolch, E. W., Reading and Word Meanings, New York: Ginn and Company, 1927, p.111.



In Dolch's analysis of word meanings in a series of readers he found 536 words having 1358 meanings. Fennell<sup>16</sup> made a study of the vocabularies of fourteen primary readers and discovered 842 meanings for 232 words or spellings. She concluded that the burden of the interpretation placed on the children is greater than realized by the teachers and that one of the real causes of difficulty in comprehension is identical words recurring with different meanings. In her analysis of the vocabularies of six primers, Lynch<sup>17</sup> found 695 words that had 1097 different word meanings. Wozencraft<sup>18</sup> analyzed five primers and five first readers, finding a total of 1734 different words with a total number of 2835 different meanings.

The use of a word in different parts of speech can increase the number of meanings of the word. Rush,<sup>19</sup> as part of her study, an analysis of primary readers, noted 641 words used as more than one part of speech. Of these 239 were used both as

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16

Fennell, Ethel L., "Recurring Words and Their Relation to Difficulties in Comprehension," Elementary School Journal, 29:42-52, September, 1928

17

Lynch, Vida M., "A Study of Word Meanings in Primers," Unpublished Master's thesis, Colorado State University, Greeley, Colo., 1938, 82p.

18

Wozencraft, Marian, "Concepts Contained in Primers and First Readers Adopted by the State of Texas," Unpublished Master's thesis, Colorado State University, Greeley Colo., 1934.

19

Rush, Mary Louise, "An Analysis of Vocabulary and Language Construction of Six Series of Primary Readers from the Standpoint of Teaching the Deaf," Unpublished Master's thesis, Washington University, Saint Louis, Mo., 1940.

nouns and adjectives, 233 both as nouns and verbs, 47 as nouns, adjectives, and verbs, 2 as both verbs and adverbs, and 1 as a noun, an adjective, a verb, and an adverb. The original word list of Gates<sup>20</sup> was divided into parts of speech, such as, well, a noun, an adjective, and an adverb. Not all uses of a given word were recorded by Gates, but this list is of more value than his later one<sup>21</sup> which recorded each word only once.

Buckingham and Dolch,<sup>22</sup> in criticizing the results of their study, which combined eleven important word lists, commented upon the fact that the meanings of words had not been recorded by any of the investigators. Thorndike<sup>23</sup> and Stone<sup>24</sup> placed all words in alphabetical order which provided no means for determining the use of the word in the sentence.

The purpose of the present study is to survey, compare, and analyze selected series of arithmetic textbooks to

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<sup>20</sup>  
Gates, Arthur I., A Reading Vocabulary for Primary Grades, New York, Teachers College Columbia University, 1926.

<sup>21</sup>  
Gates, Arthur I., A Reading Vocabulary for Primary Grades, Revised and Enlarged, New York, Teachers College Columbia University, 1935.

<sup>22</sup>  
Buckingham, B. R., and E. A. Dolch, A Combined Word List, New York; Ginn and Company, 1936.

<sup>23</sup>  
Thorndike, E. L., Teachers Word Book of Twenty Thousand Words, New York, Teachers College Columbia University, 1931.

<sup>24</sup>  
Stone, C. R., Stone's Graded Vocabulary for Primary Reading, St. Louis; Webster Publishing Company, 1941.

discover the extent of the language problem created by the use of multiple meanings of words in the text.

Four series of recently published arithmetics were surveyed to answer the following questions:

1. What words having multiple meanings occur in these books?
2. What meanings or concepts occur?
3. How do the series compare in the number of words with multiple meanings?
4. Were the meanings employed consistently in a given series?

## CHAPTER II

### PROCEDURE

The particular series of arithmetic textbooks chosen for analysis in this study met the following qualifications:

(1) recency of publication, (2) prominence of the authors in their field, and (3) publication of no two series by the same company. These are the books which were selected:

1. Series A

Daily-Life Arithmetics, Guy T. Buswell, William A. Brownell, and Lenore John, Boston: Ginn and Company, 1938.

Book I pp.281 - 568 (the fourth grade portion)  
Book II 584pp. Grades V. and VI

2. Series B

Study Arithmetics, F. B. Knight, J. W. Studebaker, and G. M. Ruch, Chicago: Scott, Foresman and Company, 1943.

Grade IV (revised) 352pp.  
Grade V 352pp.  
Grade VI (revised) 448pp.

3. Series C

Arithmetic We Use, Leo J. Breuckner, Foster E. Grossnickle, Elda L. Merton, Philadelphia: John C. Winston Company, 1942.

Grade IV 278pp.  
Grade V 311pp.  
Grade VI 312pp.

4. Series D

Arithmetic for Young America, John R. Clark, Monica M. Hoye, and C. H. Clark, New York: World Book Company, 1944.

Grade IV 297pp.  
Grade V 314pp.  
Grade VI 297pp.

Each series from the fourth through the sixth grades was examined. Every language problem was read, and a list was compiled of the recurring words whose meanings differed, and an example, as used in the text, of each multiple meaning was recorded. The separate lists were then combined and the words arranged alphabetically. Next the words were defined with reference to Webster's<sup>25</sup> and Thorndike's<sup>26</sup> dictionaries. A few words, such as box, meaning a diagram, carry, a process in multiplication and point, a coupon for rationing, were not recognized by either dictionary. Thorndike, in some instances, as for the words all, clear, and cover, showed the meanings by illustrations only.

In compiling the list, found in Table III beginning on page 25 a few generalizations were made. When the same word was found with more than one form, only one of its forms was used unless the other forms presented entirely different meanings from those already noted for the word, such as left, meaning departed, remained, and bequeathed, and leaves meaning departs and foliage. If the word occurred in only one form, that form was kept, as mixed in mixed number. Nouns used as adjectives were included where the meanings were not

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25

Webster's Collegiate Dictionary, Springfield, Mass.: G. and C. Merriam Company, 1937, pp.1274.

26

Thorndike, E. L., Thorndike Century Junior Dictionary Chicago: Scott, Foresman and Company, 1942, 940p.

sufficiently indicated as glass, in the phrase glass towel, and pig, in the phrase pig iron. Words were also listed which were used with only one meaning but that meaning not the commonly accepted one and thus a potential cause of confused concepts, such as fans, in camera fans, and firm, in a business firm. If there was a difference in form due to a capital letter as Miss, the verb, and Miss, a prefix to a name, the word was discarded. If two words were identical in appearance but not in pronunciation, as close, the verb, and close, the adjective, the words were kept. The prepositions for, from, and of were eliminated because of the fact that they call for such a large number of concepts already recognized by the teacher of the deaf.<sup>27</sup> Omitted from the list, also, were proper nouns and ordinals beyond eight.

Since the selection of the vocabulary for this study was necessarily done subjectively because no list is available against which to check, no claim is made that all recurring words with multiple meanings were discovered. However, each book was examined and the meanings recorded until two consecutive readings added less than four additional concepts. No effort was made to tabulate the frequency of use of each

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<sup>27</sup>

Davies, R. D. "Language Constructions," An Unpublished outline for Teacher's of the Deaf, 1944.

meaning. Its occurrence was recorded even if used only once.

The different words and the number of multiple meanings for each word found in the twelve arithmetic textbooks examined are totaled and shown in Table I, beginning on page 21. The total number of recurring words and the total number of different meanings for these words found in each book of each series are shown in Table II, page 24.

To summarize, the procedure used in making the analysis was as follows:

1. Words which recurred with multiple meanings were recorded for each book of each series.
2. The words were defined and the definitions verified using Thorndike's and Webster's dictionaries.
3. These recurring words were combined and listed alphabetically.
4. The textbooks were checked several times against the combined list, and occurrences noted of each meaning.
5. Tables were constructed of:
  - a. Recurring words, their various meanings, illustrations, the grade and series in which they appear.
  - b. The different words, and their total number of meanings in the twelve books.
  - c. The number of recurring words, and the number of multiple meanings found in each book of each series.

CHAPTER III  
INTERPRETATION OF DATA

This study shows the magnitude of the problem presented by multiplicity of meanings of words recurring within one text, within one grade, on one page, and even in one sentence, of arithmaetic textbooks. That special vocabulary for the subject of arithmetic is necessary, has been generally recognized since the investigations of Pressey<sup>28</sup> and others. It is a fact, commonly accepted, that a child would not likely be able to solve correctly a problem calling for the area of a rectangle unless he knew the word area. But how complete should a child's knowledge of a word bill be to enable him to attack a problem stating that a person paid a bill with a five dollar bill? For this situation the child must have the proper concepts of two entirely different meanings of this word. Therefore, recognition alone of the word is not sufficient. In addition, the child must have the concept necessary for correct interpretation of the word in each of its different uses.

29

Dearborn<sup>29</sup> showed that multiple word concepts are a problem in reading for children whose hearing is normal.

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<sup>28</sup>  
Pressey, L. C., "The Determination of the Technical Vocabulary of the School Subjects", School and Society 20: 91-96, 1924.

<sup>29</sup>  
Dearborn, Frances R., "A Study of Erroneous Word Concepts in Reading," Elementary English Review, 5: 3-6, 23 January, 1928.



That they are even a more difficult problem for the deaf child is realized when his language ability upon entering school is compared with that of his hearing brother at the same age. At school age the child who hears has learned to use language in many situations, has acquired patterns of idiomatic usage, and has a vocabulary adequate for his experience. <sup>30</sup> Dolch says,

. . . the child starts school with a large "hearing" vocabulary, estimated by some at as much as 3000 words, and then keeps increasing this "hearing" vocabulary from his contacts with other persons in daily life.<sup>31</sup>

The deaf child, however, enters school with no pattern of language, no vocabulary, and must even be taught that he has a name. Therefore, to interpret the many applications of our vocabulary correctly is an enormous task for him. For example, a child must learn that the word fair can be used to describe the weather, to refer to an honest situation, to mean an exhibition, and finally as a score on a test or paper meaning mediocrity. The four different concepts are not at all similar and can undoubtedly be misinterpreted by the child, and especially by the deaf child, unless each meaning is specifically taught.

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<sup>30</sup>

Jenkins, Frances, Language Development in Elementary Grades, New York: Thomas Nelson and Sons, 1936, p.20-21.

<sup>31</sup>

Dolch, E. W., Reading and Word Meanings, New York: Ginn and Company, 1927, p.31.

An occasion in which the secondary meaning of a word led to a misunderstanding occurred in a class of fourth grade children. They were studying a problem which stated that Mother bought five glass towels. The discussion of the problem brought out the statement, "The towels will break when they are dropped." The concept of the familiar term glass employed here as a modifier denoting use and not substance, was definitely not clear to the pupils.

It is with such multiplicity of meanings of words that this study is concerned. In Table I are listed the different words which occurred with different meanings in twelve arithmetic textbooks. Accompanying each word is the total number of different interpretations found in all the arithmetics. It is shown that a total of 1373 concepts were necessary for the 388 words listed. It is to be noted that there is a wide variation in the number of different meanings for each word form. Of the total number of words with multiple meanings 137 require two different interpretations, 101 have three different meanings, and 48 have four. Five interpretations are necessary for 36 words, six for 19 words, seven for 11 words, eight for 8 words, nine for 9 words, ten for 1 word, eleven for 3 words, twelve for 1 word, and even sixteen interpretations are necessary for 1 word.

These recurring words with their different meanings, and illustrations appear in Table III, beginning on page 25.

This table is composed of thirteen columns. The words are listed in the first column and checked in the columns to show in which books they occurred. To illustrate, the table shows that the word figure was used in seven ways:

1. A numeral occurring in twelve texts in grades IV through VI.
2. A geometric design occurring in seven texts, grades V through VI.
3. Meaning a symbol or doll, as in "The figure of Santa Claus," occurring in two texts in grades V and VI.
4. As a verb in "Figure the cost, it occurred in ten textbooks, grades IV through VI.
5. A drawing as "Figure A shows . . ." in one text in grade V.
6. As an adjective in "A two figured number" it occurred in three texts in grades IV through VI.
7. As a print in figured material," in three textbooks in grades V and VI.

Not all meanings of each word were found in all the textbooks nor were all meanings found in any one series. For example, the word light for which nine different uses were found, has two meanings checked in column one, two in column two, and three in column three. The three columns represent grades IV through VI for series A.

There is some variation in the number of different uses of the different words both within the three grades of any one series or in a given grade of all four series. These differences are presented in Table II, which shows the number of words which recurred with different meanings in each textbook and the total number of meanings. The greatest number of words with multiple interpretations was found in the Daily Life Arithmetic, Grade V.

## CHAPTER IV

### CONCLUSIONS AND RECOMMENDATIONS

This study was undertaken because it was felt that a major part of the difficulty in the solution of arithmetic problems is caused by the pupil's inability to comprehend language. As problems are necessarily expressed in words, they can not be read understandingly unless those words present a clearcut idea in the reader's mind. Technical vocabulary, essential as it is to understanding in arithmetic, has often only a single possible use, and thus presents no further difficulty when once learned. Just the opposite, however, is true of a large part of the vocabulary used in arithmetic problems because much of the English language is composed of words having more than one meaning. The deaf child with a language handicap is further handicapped in making adequate interpretations of the different meanings represented by one word.

It was the purpose of this study to discover the extent of the problem presented by words with multiple meanings found in selected series of arithmetic textbooks from the fourth through the sixth grades. The procedure used in analyzing the vocabulary of the twelve textbooks was as follows:

1. A list of words which recurred with different meanings was compiled for each textbook.
2. An example as found in the text was noted for each word.
3. The separate lists were combined.
4. The words were arranged alphabetically and defined.
5. Each textbook was checked several times against the complete list.

As stated in Chapter III, the findings showed that a very large number of words occurred which had more than one meaning. Two to sixteen interpretations for each spelling were discovered for 576 words which showed the extent of the problem presented by words with multiple meanings. There was a great lack of similarity between the meanings of some of these words as illustrated by band, found to mean a rubber band, a decoration, an orchestra, a verb meaning to join together, and also a verb meaning to place a band upon something as "Band the bird."

In comparing the textbooks it was found that (1) there is some variation in the number of words having multiple meanings between the grades; (2) one series carried a load slightly higher than the others; (3) 165 words having 487 different interpretations were found as early as the fourth grade.

The list obtained in this study serves its first purpose in bringing to the attention of teachers, and particularly to teachers of the deaf, the words that are used with multiple meanings in arithmetic textbooks. For teachers who do not realize how many there are of such words the list emphasizes the great number and the consequent necessity for constant checking of concepts. As a result of the study, it is recommended that: (1) the teacher carefully survey the vocabulary occurring in arithmetic textbooks and recognize all the meanings of a given word that are used, and (2) that she specifically teach all meanings found of a given word in order to insure comprehension and the successful solution of the arithmetic problems.

It is suggested that the list of words with multiple meanings compiled for this study serve as the starting point for further research. With these words a test might be constructed for the purpose of comparing deaf and hearing pupil's ability to interpret the meanings. Too, the vocabulary burden of arithmetic textbooks could be compared by finding the total frequency of occurrence of each word and of each different meaning used.

TABLE I

Words That Recur in Twelve Arithmetic Textbooks and The Total Number of Different Meanings for Each

Word	Number of Meanings	Word	Number of Meanings	Word	Number of Meanings
about	6	borrow	2	country	2
above	5	bow	3	cover	4
account	4	box	5	cross	5
across	2	brick	2	cup	2
addition	3	bring	3	cut	5
after	2	building	2	dash	1
against	3	bulb	2	dark	2
all	6	but	3	date	4
allow	3	buy	2	decrease	2
along	4	by	9	deposit	2
amount	3	cake	2	depth	2
answer	2	call	3	difference	2
are	2	can	5	divide	2
around	5	carry	3	down	3
articles	2	cart	2	draw	3
as	5	case	4	dress	3
ask	4	catch	2	dressing	3
at	5	caught	3	drive	4
average	7	center	2	drop	6
away	5	change	7	drove	2
back	5	charge	4	due	3
balance	3	check	3	duty	1
balloon	2	chop	2	ear	2
band	6	class	3	earn	2
bank	2	clean	2	edge	2
bar	6	clear	4	egg	2
base	4	close	3	eighth	3
bear	2	coat	2	end	6
beat	4	cold	2	equal	2
bed	3	color	3	estimate	2
before	2	column	2	even	5
begin	2	come	9	example	3
below	3	common	4	exchange	2
besides	2	complete	4	exercise	1
between	3	cone	2	express	3
bill	4	cook	2	extend	3
blank	3	copy	3	face	2
block	7	cord	3	facts	3
board	6	corner	2	faint	1
body	2	cost	2	fair	5
border	4	count	5	fall	6



Word	Number of Meanings	Word	Number of Meanings	Word	Number of Meanings
family	2	head	4	make	7
fans	2	heart	3	mark	3
fast	3	heavy	4	match	3
fat	2	help	3	material	3
far	4	high	3	measure	3
favor	1	hold	5	meat	2
feed	3	hop	3	meet	4
fence	2	in	9	milk	2
fifth	2	increase	3	mine	3
figure	7	interest	2	mixed	3
fill	5	introduce	1	model	3
find	4	iron	2	mouth	2
fine	6	is	2	nail	2
finish	3	items	2	name	4
finished	3	join	3	nearest	2
firm	1	jump	2	next	3
first	4	keep	3	nickel	2
fish	2	key	3	note	2
fix	4	label	2	notice	3
flight	2	lace	2	number	3
floor	3	lap	2	nut	2
foot	4	last	5	odd	3
fourth	2	lay	4	on	6
frame	3	leap	2	once	3
front	3	least	2	one	4
full	4	leave	6	open	3
gain	3	left	3	opposite	2
game	3	length	4	order	6
general	2	less	2	other	2
get	3	letter	5	out	9
give	7	level	2	over	10
glass	5	light	9	pack	4
go	9	like	3	paint	2
grade	6	line	3	paper	6
grains	2	list	3	part	6
ground	5	little	3	party	3
group	2	load	3	pass	5
grow	2	long	7	patch	2
guess	2	look	4	pay	3
guide	2	lost	4	pen	2
half	3	lot	3	period	4
hand	9	low	3	picture	3
handle	2	lower	5	piece	7
hard	7	lump	2	pig	2
have	4	mail	2	pile	2

Word	Number of Meanings	Word	Number of Meanings	Word	Number of Meanings
pipe	2	round	4	state	2
place	8	rule	2	statement	2
plan	3	run	11	start	3
plane	2	safe	2	station	5
plant	3	sale	5	stay	2
plates	3	save	5	step	6
play	3	saw	3	stick	4
point	9	say	3	stop	4
pole	3	scale	3	store	2
poor	3	score	3	story	3
possible	2	seal	2	stretch	2
post	5	season	1	string	4
present	3	second	3	study	2
press	2	section	4	table	2
problem	2	see	3	take	16
products	2	set	11	that	6
program	2	shade	5	then	3
prove	2	share	4	there	2
pull	2	shut	3	thing	3
puzzle	3	shell	3	third	2
quarter	3	ship	2	tie	4
race	2	shop	4	time	12
radio	3	show	6	to	5
raise	5	side	5	together	3
reach	4	sign	3	top	5
read	2	signature	1	toward	2
reading	3	since	2	track	3
ready	2	sixth	2	train	2
record	5	size	2	treat	4
regular	4	skip	1	tree	2
rent	2	slide	2	try	2
repair	3	so	7	turn	11
report	3	soda	2	under	2
rest	3	soft	2	up	6
rich	1	sound	1	use	4
right	9	space	3	walk	2
ring	5	special	3	watch	3
road	2	spend	2	way	4
roast	3	spot	3	well	5
rod	2	spring	3	whole	3
roll	3	square	4	work	4
room	3	stain	2	yard	2
rose	3	stamp	2	<b>total</b>	<b>1375</b>
rough	2	stand	5		

TABLE II

Number of Words That Recur in Each of the Twelve Arithmetic Textbooks and the Total Number of Meanings

Arithmetic Textbook	Number of Recurring words	Number of Meanings
<u>Daily-Life Arithmetics</u>		
Grade IV	167	455
Grade V	223	584
Grade VI	210	588
<u>Study-Arithmetics</u>		
Grade IV	166	439
Grade V	142	369
Grade VI	200	525
<u>Arithmetic Re Use</u>		
Grade IV	165	437
Grade V	175	442
Grade VI	172	561
<u>Arithmetic for Young America</u>		
Grade IV	186	490
Grade V	204	558
Grade VI	200	518















Words and Multiple Meanings	Series											
	A			B			C			D		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
<u>bank</u>	X			X	X		X	X		X	X	
<u>bar</u>				X			X			X		
<u>base</u>				X	X	X	X	X	X	X	X	X
<u>bear</u>												X
<u>beat</u>												X

1. Place where money is handled  
 2. Piled (snow was banked)
1. A piece of wood or metal  
 2. Evenly shaped piece of some solid (bar of soap)  
 3. A unit of rhythm in music  
 4. Bar graph  
 5. Bars in a graph (draw a bar in the graph)  
 6. Part of a bicycle (handle bars)
1. The bottom (base of a triangle, base of stand)  
 2. A station or goal as in baseball  
 3. Founded on (based on facts)  
 4. Ground (base pay for pilot)
1. Bring forth; produce (tree bears fruit)  
 2. An animal
1. Defeat (beat in a race)  
 2. Mix or stir (beat eggs)  
 3. A stroke made again and again (pulse beat)  
 4. Division of time or accent in music



Words and Multiple Meanings	Series											
	A			B			C			D		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
<u>bill</u> 1. Account of money due 2. A piece of paper money 3. That on which a bill is written (bill forms) 4. An advertisement (sale bills were handed out)	X	X	X		X	X	X	X	X		X	X
	X	X	X		X	X		X	X		X	X
			X									
<u>blank</u> 1. Space left empty (fill in the blanks) 2. Not written on (blank paper) 3. A paper with spaces to be filled in (application blank)	X	X	X			X	X	X				
<u>block</u> 1. A solid piece of wood (a block 1 inch by 1 inch by 1 inch) 2. The length of one side of city square 3. Drawing - square 4. A square of something (quilt block) 5. A unit of work (a block of work) 6. To resemble a block (block printing) 7. A quantity (block of ice)	X				X							
	X				X							
	X				X							
<u>board</u> 1. A broad thin piece of wood 2. Food for pay (room and board) 3. A group of persons managing something (school board)	X				X							
	X				X							
	X				X							







Words and Multiple Meanings	Series											
	A			B			C			D		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
3. Need (Recipe call for 2 eggs)	X	X	X		X	X		X	X		X	X
4. Ask (call on next pupil)	X	X	X		X	X		X	X		X	X
5. Sound (bird call)	X	X	X		X	X		X	X		X	X
6. A summons to telephone (telephone call)	X	X	X		X	X		X	X		X	X
7. Visits made by salesman	X	X	X		X	X		X	X		X	X
8. Summon (call meeting to order)	X	X	X		X	X		X	X		X	X
<u>can</u>	X	X	X		X	X		X	X		X	X
1. Be able to (It can fly.)	X	X	X		X	X		X	X		X	X
2. Know how to (He can read.)	X	X	X		X	X		X	X		X	X
3. A container	X	X	X		X	X		X	X		X	X
4. Contents of a can (can of corn)	X	X	X		X	X		X	X		X	X
5. Put into cans (a canning factory canned 48 cans of peas)	X	X	X		X	X		X	X		X	X
<u>carry</u>	X	X	X		X	X		X	X		X	X
1. Transfer from one place to another (bus carried people)	X	X	X		X	X		X	X		X	X
2. Arithmetic process (carry two)	X	X	X		X	X		X	X		X	X
3. Help (carry you through work)	X	X	X		X	X		X	X		X	X
<u>cart</u>	X	X	X		X	X		X	X		X	X
1. Gymnastic feat (turn cart wheels)	X	X	X		X	X		X	X		X	X
2. Small vehicle (a toy cart)	X	X	X		X	X		X	X		X	X
<u>case</u>	X	X	X		X	X		X	X		X	X
1. A container (built a case for museum)	X	X	X		X	X		X	X		X	X
2. The contents of a box (case of milk)	X	X	X		X	X		X	X		X	X



Words and Multiple Meanings	Series																							
	A						B						C						D					
	IV	V	VI	IV	V	VI	VI	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI					
3. If (in case of accident)	X	X	X																					
4. Instance (tell in each case)							X																	
<u>catch</u>																								
1. Amount caught (total catch)																								
2. To capture (catch bass)	X																							
<u>caught</u>																								
1. Capture (caught a fish)																								
2. Attract (caught his eye)																								
3. Be careful (don't get caught)																								
<u>center</u>																								
1. Middle point (center of circle)																								
2. Place considered as the middle of activity (milling center)	X																							
<u>change</u>																								
1. To exchange (change papers)	X	X	X																					
2. Put something in place of another (change oils)	X	X	X																					
3. Make different (Change mixed number to a fraction.)	X	X	X																					
4. Become different (prices change, speedometer change)																								
5. Alteration (make changes in the cabin)																								
6. Money above purchasing price (How much change after \$1.00 purchase?)																								
7. Small coins (He had \$3.00 in change)	X	X	X																					



Words and Multiple Meanings	Series											
	A			B			C			D		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
<u>clear</u> 1. Understood (Explain what is not clear) 2. Go over (clear mountain peak) 3. Remove things (He cleared his land.) 4. Not cloudy (clear day)	X	X	X X X		X X	X	X	X	X	X	X	
<u>close</u> 1. Shut (close your book) 2. Bring to an end (bazaar closed) 3. Near	X X X	X X	X X X	X	X X X	X	X X	X X	X	X X	X X	X X
<u>coat</u> 1. Outer garment 2. Thin layer (coat of paint)	X		X X	X	X	X X	X	X X	X	X X	X X	X
<u>cold</u> 1. Less warm 2. Common sickness	X	X X	X	X	X	X	X	X	X	X	X	X
<u>color</u> 1. Red, yellow, blue, etc. 2. Change color of (color 5 balls) 3. Having color (the colored balls)	X	X X	X X X	X X X	X	X	X X X	X X X	X	X X	X X	X
<u>column</u> 1. A structure (stone column) 2. A row (column of numbers)	X	X X	X X	X X	X X	X	X X	X X	X	X X	X X	X X



Words and Multiple Meanings

		Series											
		A			B			C			D		
		IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
<u>cone</u>	1. A solid that has a flat round base and narrows to a point at the top					X						X	
	2. Anything shaped like a cone (ice-cream cone)	X	X	X	X		X				X	X	
<u>cook</u>	1. Prepare food by using heat	X	X		X					X			
	2. Person who cooks							X	X				X
<u>copy</u>	1. Thing made to be just like another (a copy of the page)	X			X								X
	2. Make a copy of (copy the examples)	X	X	X	X		X	X	X			X	X
	3. One of a number of books, magazines, etc., made at the same printing (Magazine sold at 10 cents a copy.)	X			X		X		X		X		X
<u>cord</u>	1. Thick well made string												
	2. A measure of cut wood	X					X						X
	3. Resembling a cord (electric cord)		X	X						X	X		
<u>corner</u>	1. Place where two lines or walls meet	X	X	X	X							X	X
	2. Place where two streets meet												

Words and Multiple Meanings	Series											
	A			B			C			D		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
<u>cost</u>	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X
<u>count</u>	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X
<u>country</u>	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X
<u>cover</u>	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X

- cost
1. Price paid (The cost was \$5.00)
  2. To have as its price (Cabins cost \$2.00)
- count
1. Name numbers in order (count to twenty by twos)
  2. Add up (He counted 10 birds.)
  3. Assigning (counting 30 days to a month)
  4. Consider (count fraction of cent as whole cent)
  5. Music (one beat equals one count)
- country
1. All the land of a nation (foreign country)
  2. Rural region (drove to the country)
- cover
1. To place a covering over (cover with paper)
  2. A binding for a book
  3. Anything that conceals (cover for a sofa)
  4. To pass over a distance (train covered 10 miles)

Words and Multiple Meanings

Series

A		B			C			D			
IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
	X	X		X	X	X		X		X	
X	X				X						X
X		X		X		X			X		X
		X				X		X	X		X
X	X		X	X		X	X		X	X	
X									X		X
X											X
X											X
X											X
X											X
X											X
X											X

gross

1. To traverse (cross ocean)
2. Mark with an "X" (make a cross on paper)
3. Draw a line through (cross out)
4. Crossing (cross two sticks)
5. A stick with another across it (cross for a kite)

cup

1. A shallow dish with a handle to drink from
2. Contents of a cup (cup of sugar)

cut

1. To divide in parts (cut wood, cheese, material, etc.)
2. Distance lessened (short cut)
3. To imprint (cut stencil)
4. Piece that has been cut (a choice cut of meat is steak)
5. Slit (pass through cuts)

dash

1. A short race (100 yard dash)

dark

1. Shade of color (what part is dark)
2. Night (after dark)

Words and Multiple Meanings	Series											
	A		B			C			D			
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
<u>date</u> 1. Time (give date of arrival) 2. Period of time (at that date) 3. Belong to a certain period of time (records date from 776 B.C.) 4. The fruit of a palm	X	X		X	X		X	X		X	X	
<u>decrease</u> 1. Make less 2. Amount by which a thing is made less			X	X			X			X		X
<u>deposit</u> 1. An amount of money to put in bank 2. Act of putting money in bank						X	X					X
<u>depth</u> 1. Extending below the surface 2. Extending far back from front or outer part	X	X							X			X
<u>difference</u> 1. Being different (there is a difference between the two) 2. Remainder	X		X	X					X	X		X
<u>divide</u> 1. Separate into parts 2. Share (divide the cake among you)	X	X		X	X		X	X		X	X	X









Words and Multiple Meanings	Series											
	A			B			C			D		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
<u>end</u>	X	X	X	X	X	X	X	X	X	X	X	X
1. Last part (end of arm)												
2. The part where a thing begins or where it stops (ends of dog house)	X	X	X	X	X	X	X	X	X	X	X	X
3. Conclusion (end of summer)												
4. Bring to an end (Theodosius ended Olympic Games in 543 A.D.)	X			X								
5. Come to an end (bar ends one inch over --)												
6. Had at the last (end up with \$2.00)	X					X						
<u>equal</u>	X			X		X						
1. Same in amount, size or number (equal squares)												
2. Be the same as (Four times five equals twenty)	X			X		X			X			
<u>estimate</u>												
1. A judgement as to how many, how much, etc. (What is your estimate?)												
2. Form a judgement of (estimate the answer)	X			X		X			X			
<u>even</u>	X			X		X			X			
1. Not odd, divisible by two (even numbers)												
2. No more or less than (even trade)	X			X		X			X			
3. Not withstanding (even if you make no mistake)	X			X		X			X			







Words and Multiple Meanings	Series											
	A			B			C			D		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
<u>far</u> 2. Having much flesh (fat boy)			X									
<u>far</u> 1. What is the difference (how far to ---?) 2. Until now (so far this year) 3. Very much the opposite (far from accurate) 4. Distant (far corner of field)	X	X	X	X	X		X		X		X	
<u>favor</u> 1. A gift (favors for a party)											X	
<u>feed</u> 1. Give food to (to feed a cow ---) 2. Food for livestock (value of the feed) 3. Supply (gasoline feed line)	X	X	X	X	X		X	X		X	X	X
<u>fence</u> 1. Something put around a yard, garden, etc. 2. Put a fence around		X	X	X	X					X	X	
<u>fifth</u> 1. Next after the fourth 2. One of five equal parts	X	X	X	X	X					X	X	X











	Series											
	A			B			C			D		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
<b>Gain</b>	X	X	X	X	X	X	X	X	X	X	X	X
<b>Game</b>	X	X	X	X	X	X	X	X	X	X	X	X
<b>General</b>	X	X	X	X	X	X	X	X	X	X	X	X
<b>Get</b>	X	X	X	X	X	X	X	X	X	X	X	X

Words and Multiple Meanings

Gain

1. Profit (What was his gain?)
2. Increase (gain weight)
3. Get more time (gain 3 hours)

Game

1. Things needed for a game (he bought a game)
2. A contest with certain rules (football game)
3. Having to do with hunting (game warden)

General

1. For all (general admission)
2. Person in command (famous general)

Get

1. Charge (get 10 cents for --)
2. Solve (get an answer)
3. Become (get warm)
4. Arise (get up)
5. Solicit (get votes)
6. To go from -- to -- (to get from New York to Los Angeles)
7. Obtain (get a radio)
8. Go on or in (get on a scale)



































Words and Multiple Meanings	Series											
	A			B			C			D		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
4. Score (mark your paper)			X			X	X	X				
5. Set apart by (to mark members of the team)		X										X
6. To indicate by mark or symbols (mark the places)				X		X		X				X
7. Bearing a mark (the bar marked Monday)		X		X		X		X				X
<u>match</u>												
1. Find the equal of		X					X					X
2. A short slender piece of wood tipped with ignitable mixture		X					X					X
3. Similar to (Get envelopes to match)		X					X					X
<u>material</u>												
1. Cloth		X					X					X
2. Ingredients in food		X					X					X
3. Used in construction (radio material)		X					X					X
<u>measure</u>												
1. Find the size or amount of (measure the room)		X					X					X
2. Be of certain size or amount (buy paper that measures 3" by 2")		X					X					X
3. Something with which to measure (a quart measure)		X					X					X
4. A system of measurement (liquid, dry, square measure)		X					X					X
5. A bar of music		X					X					X





Words and Multiple Meanings	Series											
	A			B			C			D		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
<u>nearest</u> 1. Not far from (the nearest city) 2. Closest (the nearest whole number)	X	X	X		X	X				X	X	
				X	X	X				X	X	
<u>next</u> 1. Nearest (next size) 2. Nothing of the same kind coming in between (next line) 3. In the next place (he wrote the problem, next)	X	X	X		X	X				X	X	
				X	X	X				X	X	
<u>nickel</u> 1. A metal 2. A coin	X	X	X		X	X				X	X	
				X	X	X				X	X	
<u>note</u> 1. A written sign in music 2. A message (He found a note.)	X	X	X		X	X				X	X	
				X	X	X				X	X	
<u>notice</u> 1. To observe (notice that 4/3 is 2/4 inverted) 2. Information (they posted a notice) 3. Idiomatic (at a moment's notice)	X	X	X		X	X				X	X	
				X	X	X				X	X	
<u>number</u> 1. Count or sum of things or persons (the number of sheets is 10) 2. A figure or mark that stands for a number	X	X	X		X	X				X	X	
				X	X	X				X	X	













Words and Multiple Meanings	Series																	
	A			B			C			D			E			F		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
2. Money given for work (\$20.00 in pay)	X	X	X				X									X	X	X
3. Worth while (pay you to memorize)				X	X	X							X					
<u>per</u>																		
1. Small yard for animals	X	X	X															
2. Tool used in writing				X	X	X												
<u>period</u>																		
1. Portion of time marked by events that happen again and again (lunch Period)	X	X	X															
2. A series of years (five year period)				X	X	X												
3. Groups (put in ones period or hundreds period)	X	X	X															
4. Dot (period after abbreviation)							X											
<u>picture</u>																		
1. A drawing	X	X	X				X	X	X									
2. Draw (picture the answer)																		
3. Containing Pictures (picture graph)	X	X	X				X	X	X									
<u>piece</u>																		
1. Limited part (piece of land)																		
2. Small quantity (piece of bread)	X	X	X															
3. Coin (fifty cent piece)	X	X	X															
4. Quantity in which goods is sold (Piece of material)	X	X	X															
5. Single thing of a class (piece of mail)	X	X	X															































Words and Multiple Meanings	Series															
	A				B				C				D			
	V	VI	IV	V	VI	V	IV	V	VI	V	IV	V	VI	V	IV	V
7. Plant (set out flowers)	X															
8. Fix at a certain amount (set a price)			X	X											X	X
9. Put eggs in nest (set hens)																
10. Young plants (onion sets)																
11. An instrument (radio set)																
<u>shade</u>																
1. Not in the sunshine (98 degrees in the shade)																
2. Make darker than the rest (Shade of the circle.)																
3. Cover for lamp																
4. Curtain to shut out light at window																
5. Darker than the rest (the shaded picture)																
<u>share</u>																
1. Part belonging to one individual (His share was 8 quarts.)																
2. Each of the parts into which ownership of company or corporation is divided (shares of mine)																
3. Divide into parts, each taking a part (share candy)																
4. Take part (share the work)																
<u>sheet</u>																
1. Large piece of cloth used to sleep on or under (She made sheets for the bed)																







Words and Multiple Meanings	Series											
	A			B			C			D		
	IV	V	VI	IV	V	VI	IV	V	VI	IV	V	VI
<u>soft</u> 1. Without alcohol (soft drinks) 2. Bituminous (soft coal)			X									X
<u>sound</u> 1. Seem (it sounds like magic)												X
<u>space</u> 1. Unlimited room extending in all directions 2. Limited room or place (leave space for work) 3. Separate by spaces (space the letter)	X	X	X		X			X				X
<u>special</u> 1. Unusual (special sale) 2. Commodities offered for sale (specials) 3. Kind (sent by special delivery)	X	X	X		X			X		X		X
<u>spend</u> 1. Pay out money (She will spend \$6.00.) 2. Use time (spend 3 hours --)	X	X			X			X		X		X
<u>spot</u> 1. Mark, stain, speck 2. See (Can you spot the airplane?) 3. Place (Mark the hard spots on the page.)										X		X



























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