

1953

# Games, puzzles and riddles, and handwork to be used for arithmetic drill in grades five and six

---

<https://hdl.handle.net/2144/9454>

*Downloaded from DSpace Repository, DSpace Institution's institutional repository*

Ed  
Service  
Paper  
Grant, M. L.  
1953

BOSTON UNIVERSITY

Service Paper

GAMES, PUZZLES AND RIDDLES, AND HANDWORK TO BE USED  
FOR ARITHMETIC DRILL IN GRADES FIVE AND SIX

By

Madelyn L. Grant, B. S. in Ed.

Framingham State Teachers College, 1940

Submitted in partial fulfillment  
of the requirement for the degree  
Master of Education

August 1953

Boston University  
School of Education  
Library

First Reader: Dr. J. Fred Weaver, Assistant Professor  
of Education

Second Reader: Dr. Mark Murfin, Associate Professor of  
Education

### Acknowledgment

The writer wishes to acknowledge the kind assistance and helpful guidance of Dr. J. Fred Weaver under whose direction this service paper was prepared.

## TABLE OF CONTENTS

CHAPTER	PAGE
I. Statement of the Problem.....	1
Justification.....	1
Procedure.....	2
II. A. Games - Introductory Statement.....	5
Group 1.....	6
Group 2.....	13
Group 3.....	27
B. Puzzles and Riddles.....	31
C. Handwork.....	39
D. Concluding Statement.....	51
Appendix.....	i
Bibliography.....	vi

## CHAPTER I

Statement of the Problem:

The purpose of this study is to collect games, puzzles and riddles, and examples of handwork that may be adapted for use in arithmetic drill in grades five and six.

Justification:

One of the aims of the elementary school is to teach the mastery of the fundamental processes of arithmetic. However, standardized tests given at the end of the six years often show inefficiency in adding, subtracting, multiplying, and dividing of whole numbers and fractions, both common and decimal.

Following a meaningful introduction to each new phase taught, drill has an important place in the program: to develop efficiency in the use of the new skill, to make responses automatic, and to give the child a feeling of mastery. Drill is also helpful in maintaining efficiency in previously learned skills. In the primary grades the children play games and draw and color pictures in workbooks to practice using number concepts. Drill in the upper grades too frequently becomes simply a tiring and sometimes meaningless repetition of material. Yet children in grades five and six also possess those qualities of curiosity, desire for bodily and mental activity, interest in competition and cooperation, inherent characteristics that make up the desire for play which can be used by the teacher to make drill interesting.

The teacher of grades five and six who recognizes this is faced with a lack of adequate material in the field.

Procedure:

Arithmetic books, both text and supplementary, were examined for games to be used for arithmetic drill in grades five and six. These are listed in the bibliography. Although some material was found for primary grades, suitable material for upper grades was almost non-existent. Any "games" found proved to be disguised exercises--i. e. two groups do examples to see who can get the answer first.

Since arithmetic books did not provide adequate material, books on games for classroom and playground were examined to determine whether games designed purely for recreational purposes could be adapted. After the game was altered to include arithmetic practice, it was measured against the following criteria:

1. Is there an element of competition?
2. Is it suitable for the age level?
3. Is it useful for the purpose for which it is intended or is it so complicated that number work is secondary?
4. Does it justify the time spent for the value received?
5. Does it give practice to those who need it by not eliminating those who give wrong responses?

6. Can it be adapted
  - a. for use in drilling several different arithmetic processes
  - b. for slow as well as bright children in a given grade?
7. Is it suitable for use within the usual facilities of the school classroom, playground, or gymnasium?
8. Is it a game, once explained, that can be played by the children without too much supervision by the teacher?

If the game did not suit these criteria, it was discarded. If the game seemed to satisfy most of the criteria, it was tested on an actual class of the Deerfield School, Westwood, Massachusetts. This was the final test for inclusion. Some games were found to be suitable for the whole class, while others were found to be more practical for use in small groups. Many of the games are original with the writer or are adaptations of games played by children for years. The games finally chosen appear in Sect. A of Chap. II.

Section B of Chapter II is made up of puzzles and riddles.

The criteria for these were:

1. Do they provide arithmetic experiences at fifth or sixth grade level?
2. Can they be answered by clear thinking rather than by "tricky" answers?



Finally, Section C of Chapter II contains articles of hand-work using arithmetic processes. In order to be included the items were measured against the following criteria:

1. Is the completed article artistic or useful enough to interest the child in making it?
2. Does the time consumed in manipulation provide adequate and worthwhile arithmetic experiences?
3. Is it suitable for the age level?
4. Are the materials needed readily obtained and inexpensive?
5. Could a child carry out the project by himself from printed directions?

Many of the articles for which directions are given could be used in projects for social studies in grades five and six, i. e.

Cork Castle--study of the Middle Ages: Cowboy Spurs--study of the Western States; Salt Beads and Match Box-- Christmas Gifts.

## CHAPTER II

## SECTION A - GAMES

Introductory Statement:

The games in this chapter were classified for use in the early fifth grade, late fifth grade and early sixth grade, and late sixth grade based on the course of study used in Westwood, Massachusetts. Courses of study in other cities and towns may vary, necessitating the use of a particular game at a different time.

Directions for each game include:

1. Purpose
2. Place where it can be played
3. Number of children required
4. Equipment needed

Adaptations for many of the games have been included, making them useful in drilling more than one skill. Additional adaptations will be evident to the classroom teacher.

GROUP I

For Early Fifth Grade

The following games are to be used early in grade five. They can also be used for the slow child in either grade five or six.

In many cases these games include adaptations which make them useful at a higher level.

### AROUND THE CIRCLE

- Purpose:** To be used in both fifth and sixth grades to check mastery of basic facts
- Place:** Classroom
- Numbers:** Whole class
- Equipment:** A piece of thin wood about 30 inches square. On it draw a large circle with numbers from 1 to 9 around the edge in the form of a clock face. Use chalk. In the exact center of the circle nail a one-inch length of a dowel. A piece of an old broom handle will do. Cut a 20-inch length from a thin wooden yardstick. Make a hole through it at the 10-inch mark. Drive a large nail with a wide head through it into the dowel. You now have a pointer that will swing on a pivot. It can be used flat on a table or set in the chalk tray against the board so all can see.

Spin the pointer and multiply the two digits at either end. Child who answers correctly may be next to spin pointer.

**Adaptation I:** Add the digits at either end of pointer.

**Adaptation II:** Change digits to larger numbers. Subtract smaller number at one end from larger at other end.

**Adaptation III:** Divide smaller number into larger, giving answer and remainder.

**Adaptation IV:** Put simple fractions around circle. Add fractions at ends of pointer.

**Adaptation V:** Make digits around circle into decimal fractions, .1, .2, .3, etc. Multiply.

## MINE

Purpose: Drill on facts for four processes

Place: Classroom

Number: Two players

Equipment: 1 set of addition cards

1 set of matching answer cards

1 set of matching number-word cards

Cards are shuffled and dealt. Each child puts his cards face down. To play, each child turns up the top card. If they match, the first player to say "mine" gets both cards. If they do not match, play continues. If a player says "mine" when they do not match, other player gets cards. Player with the most cards at the end of the game wins.

Adaptation I: Use only first two sets mentioned above, one child having the addition facts, the other having the answers. Continue as above.

Adaptation II: Use the game with subtraction, multiplication, or division facts.

Adaptation III: A game called "LARGER". The player who turns up the larger card wins the faced cards, i.e. Player A turns up card marked "27"; Player B turns up card marked "3 x 7"; Player A wins both cards. "SMALLER" is played the same way.

Adaptation IV: This game can also be used for drill on common fraction-decimal or common fraction-per cent equivalents.

## NUMBER ELEVEN

**Purpose:** Practice in rapid adding  
**Place:** Classroom  
**Numbers:** Played by pupil alone  
**Equipment:** Four sets of cards numbered one to ten

This game is somewhat like solitaire. Each player makes four sets of cards numbered from 1 to 11. To play, deal six cards in a row, first card up, rest of row face down; second row, one card face up on #2 pile, rest of row face down; third row, one card face up on #3 pile, rest of row face down. Continue until card comes face up on last pile.

To play, remove any two cards in sight that equal 11. Turn up top card in "blank" piles. When all possible plays are made, start on pack. From back of pack count two cards and turn up the next one. See if it will match any of the others to make 11. Continue through pack turning up every third card. Object is to get rid of all cards.

This will come out oftener than regular solitaire.

**Adaptation:** "EVENS" is an adaptation of this game which will provide practice in multiplication of basic facts. In the game of "ELEVEN" instead of adding two facing cards, multiply them. If the answer is an even number, remove them. Continue as in "NUMBER ELEVEN" multiplying instead of adding.

## MATHEMATICAL BASEBALL

Purpose: Review of multiplication facts  
Place: Classroom, playground or gymnasium  
Number: Two teams of five each  
Equipment: None

Four bases are laid out six or eight feet apart in the room. A pitcher, catcher, and three basemen are needed for a fielding team. The batter from the opposing team takes his place at bat and the pitcher calls " $3 \times 4$ " or some similar problem. If the catcher calls the answer before the batter, the batter is out. If the batter answers first, he goes to first base. The runner goes to second base when the next runner goes to first. However, the pitcher may turn to him while on base at any moment and state a problem such as " $6 \times 3$ " and if the baseman answers first, the runner is out. If runner answers first, he goes to the next base. Thus, runners and basemen must be constantly alert. Three outs mean a change of team at bat as in regular baseball.

Although this game eliminates for wrong answers, the game goes so quickly that one who misses is soon up again either as a fielder or batter so that he gets the required practice.

Adaptation I: Pitcher may call ".5." Answer-- $\frac{1}{2}$

Adaptation II: Pitcher may call ".6 and .7." Answer--1.3

### THIRTEENS

**Purpose:** Practice in adding and multiplying

**Place:** Classroom

**Numbers:** 4 to 6 players

**Equipment:** Four sets of cards numbered from 1 to 13

Oak tag cut same size as ordinary playing cards or  
3" x 5" unlined file cards may be used

Shuffle cards and spread face down on table. First player draws 3 cards and keeps the highest, putting the other two in the discard pile. The same player draws again, taking 2 cards. This time he keeps the lowest, discarding the other. On the third draw he takes one card. The first two are added and multiplied by the third card. Each child does the same. The one with the highest score wins.



## CRAZY BLACKBOARD ARITHMETIC

Purpose: Mixed practice for accuracy and speed

Place: Classroom

Numbers: Teams of equal number with four or five children in each team

Equipment: None

The first player in each team will go to the blackboard. The teacher will ask a question that has a number answer. Players write that number. Second players go to the board. Teacher asks another question and then tells them to subtract (or add, multiply, or divide) it from the first. The next player goes to the board, answers a question and does what the teacher says each time. If, when a player goes to the board, he sees a mistake, he may correct it before going on. When all are finished, correct answers score a point for the team.

## Sample:

Number of pigs in the story	3
Multiply by the number of dwarfs in Snow White	$\frac{7}{21}$
Subtract number of pints in a quart	$\frac{2}{19}$
Add the number of singers in a quartet	$\frac{4}{23}$

Difficulty of this can be varied by teacher's questions. It is useful in reviewing common measures. Multiply the number of feet in a mile by the number of inches in a foot, etc.

GROUP 2

For Late Fifth and Early Sixth Grade

The games in this section can be used for late fifth grade or early sixth.

In some cases these games include adaptations which make them useful for processes at a higher level.

## ATTENTION RUN

Purpose: Practice in reducing common fractions to lowest terms

Place: Classroom or gymnasium

Numbers: Two equal teams. Six on a team is about right but more or less can be used.

Equipment: None

Each member of each team is given a reducible fraction equivalent to one the teacher will call. Teacher calls " $\frac{1}{2}$ ". The member of A team who has  $\frac{4}{8}$  and the member of B team who has  $\frac{5}{10}$  run all the way around their respective lines and back to place. The one who gets back to place first scores one point for his team.

Adaptation: Members of A team are given common per cents, 50%,  $12\frac{1}{2}\%$ , etc. Members of B team are given .5,  $.12\frac{1}{2}$ , etc. When teacher calls " $\frac{1}{2}$ ", member of each team who has equivalent runs completely around his team and back to his own place. Score as in game above.

## FRACTIONAL OLD MAID

- Purpose: Practice in recognizing reducible fractions
- Place: Classroom
- Numbers: Four
- Equipment: Three cards of each of the following:  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{5}{8}$ ,  $\frac{7}{8}$ ,  
 $\frac{2}{3}$ ,  $\frac{1}{3}$ ,  $\frac{3}{4}$ ,  $\frac{3}{8}$ ,  $\frac{5}{6}$ ,  $\frac{1}{8}$ , and one card of each of  
the following:  $\frac{6}{8}$  and  $\frac{2}{4}$

All 32 cards are dealt. Each player examines his cards to see if he has any books (3 of any one thing). If he does, he puts them face down on the table. Person to left of dealer draws one card from dealer. If it matches two he has, he puts that book down. If not, next person draws from him and so on. When game is finished, person left with the  $\frac{6}{8}$  or the  $\frac{2}{4}$  is an "Old Maid." There will be two of them. Teacher can give additional practice by substituting a new set of 3 proper fractions each time or by changing the reducible fraction each hand.

## HOT POTATOES

Purpose: Practice in changing improper fractions to mixed numbers

Place: Classroom

Numbers: Any

Equipment: A card for each player with a fraction on it.

Whistle

Each child has a card, about 2" x 3", which has a fraction written on one side. All but three are proper. They pass them, face down, to the left until a whistle blows. Each child must then show his card. If he has a proper fraction or can change his improper fraction to a mixed number he receives no score. If he fails, he scores one point against him. Game continues and low score wins. Teacher may substitute new cards each round as children master the ones they have.

Adaptation: Instead of including improper fractions, three decimal fractions may be included. If child can change his decimal fraction to a common fraction he receives no score.

## CALENDAR PITCH

- Purpose:** Practice in adding larger numbers mentally
- Place:** Classroom
- Numbers:** Groups of four
- Equipment:** A large page from a calendar pasted on heavy cardboard

The children take turns pitching tiddly winks to get a score. The distance from the calendar page depends on its size. If child gets a score of 12 the first time and 24 the next time, he should be encouraged to add 10 plus 20 and 2 plus 4 to get an answer. If chip lands between dates, he gets the smaller. If it lands on Sunday, he subtracts ten from his score. If it lands on Saturday, he gets the number it landed on plus ten. The first player to get one hundred wins.

### BLACK CIRCLES

- Purpose:** Practice in changing improper fractions to mixed numbers. Reducing fractions to lowest terms.
- Place:** Classroom or gymnasium
- Numbers:** Entire class
- Equipment:** Several black circles with fractions, proper, improper, and reducible on them. Record player or piano.

Black paper circles are arranged in a circle on the floor. Children march around stepping on each circle as they come to it. When music stops, each child that is on a reducible or improper fraction scores two points against him. If he can change the fraction to a mixed number or reduce it, he scores only one point against him. Object of the game is to get the lowest score.

## FRACTIONAL RUMMY

Purpose: Practice in adding unlike fractions

Place: Classroom

Numbers: Two or three

Equipment: Have six cards marked  $\frac{1}{2}$ , six marked  $\frac{1}{4}$ , six marked  $\frac{1}{8}$ , and six marked  $\frac{3}{4}$ .

The object of the game is to match cards to make whole numbers. The one who can get all his cards matched to total whole numbers first wins.

Five cards are dealt to the players. The rest are placed face down in the middle. Left of dealer draws first. He examines this card to see if it will help him. If he keeps it, he must discard one of his others, face down. Next player draws. This continues until one can lay down his whole hand to equal whole numbers, i.e. He may have  $\frac{1}{8}$ ,  $\frac{1}{8}$ ,  $\frac{3}{4}$ ,  $\frac{1}{2}$ ,  $\frac{1}{2}$ , which equals 2, so he may go out. His score for that hand is 2. Others score 0. Keep score for several hands. Highest score wins.

Adaptation I: To make the game more difficult, mixed numbers and/or harder fractions may be added to the pack.

Adaptation II: The same game may be played using decimal fractions instead of common fractions.



## TIC-TAT-TOE

- Purpose:** Practice in mental addition
- Place:** Classroom
- Numbers:** An individual may play by himself or two may play together
- Equipment:** A sequence of cards about  $1\frac{1}{2}$  inches square numbered from 1 to 9

Cards are shuffled thoroughly and placed in rows of three each face up. The game is to arrange the cards so that the sum of each row, horizontal, perpendicular, and diagonal is 15.

**Answers:**

816	438	492	294
357	951	357	753
492	276	816	618

## HOW MUCH TIME HAVE YOU?

**Purpose:** Addition of simple fractions

**Place:** Classroom

**Number:** Entire class

**Equipment:** Tiny paper hour glasses marked  $\frac{1}{2}$  hour,  $\frac{1}{4}$  hour,  $\frac{3}{4}$  hour, 30 minutes, 20 minutes, 40 minutes, 45 minutes, etc.

Hide around the room the paper hour glasses. Explain that a great deal of time has been lost. At a signal, the children hunt for the bits of paper. When whistle blows, each goes back to his seat. The child who has found the most time wins.

## LAWYER, LAWYER

Purpose: Practice in reducing fractions to lowest terms  
Place: Classroom  
Numbers: Eight, ten, or twelve players plus one "lawyer"  
Equipment: None

The "lawyer" walks up and down between two equal rows of "witnesses." Without warning he points at one and says " $\frac{6}{8}$ " or some reducible fraction. The player must not answer, but his partner across the aisle must immediately say " $\frac{3}{4}$ ". If he fails to answer immediately, he and his partner must go to the end of the line. Object of the game is to stay at the head of the line for five minutes.

Adaptation I: Use improper fractions which must be changed to mixed numbers.

Adaptation II: Lawyer gives a per cent such as 25%. Witness must answer " $\frac{1}{4}$ ."

## TONY SAYS

Purpose: Practice in reducing fractions to lowest terms  
Place: Classroom or gymnasium  
Numbers: Entire class  
Equipment: None

Leader does various motions with his hands and arms, at the same time saying, " $\frac{1}{4}$ ", " $\frac{1}{2}$ ", etc. Children imitate motions. However, if the leader should say " $\frac{6}{12}$ ", children should not do this motion because this fraction can be reduced. A child who does, scores one point against him. At end of game children who have smallest scores win.

Adaptation: Leader may say an improper fraction in a list of proper fractions. Child who followed motion on improper fraction would score one against himself.

## CATCH AND ANSWER

Purpose: Practice in changing improper fractions to mixed numbers

Place: Classroom or gymnasium

Numbers: Up to twelve. All children could participate if several groups are set up; however, it is a little more difficult for the teacher to watch responses of more than two groups.

Equipment: Playground ball for each group.

Teacher stands in middle of circle and tosses ball to a child saying, " $7/6$ ." The child says, " $1\ 1/6$ ." He in turn tosses it to another child saying, " $8/5$ " or some other improper fraction. Much of the fun of this game comes when thrower tosses ball to child at whom he is not looking. Each correct response scores one point for the player. Child who fails to answer correctly must return ball to player from whom he received it. Game continues. Highest score (or scores) wins.

Adaptation: Child who is tossing ball says, " $\frac{1}{4}$ ." Child who catches answers, ".25." This gives practice in common fraction-decimal fraction equivalents.

### BIRD CATCHER

Purpose: Mental addition of whole numbers

Place: Classroom

Numbers: About ten

Equipment: None

Children sit in a circle, each taking a number. A pupil sitting in the center gives an example. When the result is the number of any pupil, he holds up his hand. Children who are caught fewest number of times win. Leader should announce that he will stay within a certain range, for example 12 to 36. He then says, "14 and 9." Child who is number 23 must hold up his hand. Winner is in center for next game.

Adaptation: Game may be played to give practice in subtraction.

Center says "27 take away 9." Child who is number 18 must hold up his hand.

## BROTHERS

Purpose: Practice in reducing fractions to lowest terms

Place: Gymnasium

Numbers: Entire class

Equipment: Whistle or record player

Tags

Arrange two concentric circles, each child having a partner. Children on outside have tags marked  $\frac{1}{2}$ ,  $\frac{1}{8}$ ,  $\frac{1}{3}$ , etc. Children on inside have tags marked  $\frac{2}{8}$ ,  $\frac{2}{4}$ ,  $\frac{4}{8}$ , etc. They march in opposite directions. When whistle blows or music stops, they try to find their "brothers" or equivalent fraction. Last two to get together score a "dud." Pair with most "duds" at end of game are orphans. Tags are changed and game is repeated.

Adaptation I: The two sets of tags may have improper fractions and their equivalent mixed numbers on them.

Adaptation II: One set of tags with common fractions and one set with per cents on them may be used.

GROUP 3

For Late Sixth Grade

This section contains games for middle to late sixth grade. They are also useful for the brighter child.



### BEAN BAG BOWLING

**Purpose:** Practice in adding decimal fractions

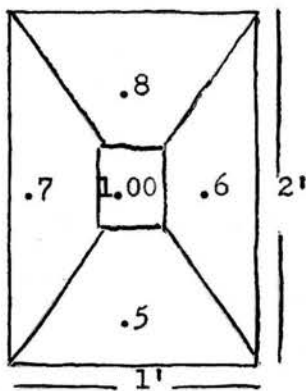
**Place:** Classroom or gymnasium

**Numbers:** Entire class

**Equipment:** Bean bags

Divide class up into equal teams of three or four. Too many on a team makes for too much waiting and not enough activity.

For every two teams draw the following diagram on the floor.



Each member of a team bowls 2 bean bags. Score is counted according to where the bag lands. If bag lands on a line, number where largest portion of bag rests is counted. Team with highest score wins. Children should stand fifteen feet from the diagram.

## MORRA

- Purpose:** Practice in estimating
- Place:** Classroom
- Numbers:** Four or five. More can play but game is apt to move too slowly.
- Equipment:** None
- Ice cream sticks (see adaptation)

This is a very old Roman game, still played in Italy today. Players sit in a circle. At a given signal, players extend several fingers. An immediate estimate is made of the total fingers extended. They are then added to see who guessed closest.

**Adaptation:** The game can be made more difficult by having children hold out groups of ice cream sticks. These sticks can be purchased cheaply, in bundles of a thousand, from any ice cream company.

## PEGGY

- Purpose:** Practice in estimating distance
- Place:** Playground
- Numbers:** Four or five
- Equipment:** A "peggy" or piece of wood, one inch square and three or four inches long, sharpened at each end. A bat, made from a wooden shingle, about six inches wide and eighteen inches long. A table tennis paddle may be used, but this takes more skill. Yardstick.

Each player hits the end of the "peggy" as it lies on the ground. It flies into the air and he hits it again. He then estimates the distance it flew in feet. If he guesses too much, he receives no credit. If he guesses within 3 feet (leader may vary this according to the skill of the children), he counts one point for himself. First to reach a previously decided score wins.

## SECTION B - PUZZLES AND RIDDLES

### Introductory Statement:

The puzzles and riddles in this section are not classified. However, purpose, place, number of children, and necessary equipment are indicated for each puzzle or riddle.

## MAGIC PUZZLE

Purpose: Mixed practice  
 Place: Classroom  
 Numbers: Entire class  
 Equipment: Pencil and paper

Teacher says: Write down a number. Any number will do, but if you take a small number, the problem will be easier to work. Multiply this number by 3. Now add 1. Multiply by 3. Add your original number. Tell your answer when I call on you, and I will tell you what your original number was.

Note to teacher: Take the product and strike off the last number. The remaining number will be the original one.

Example: Original number

8	
<u>  </u> <u>  </u>	
24	
<u>  </u>	
+1	
25	
<u>  </u>	
75	
<u>  </u>	
+8	(original number)
<u>  </u>	
83	

## BUILDING PYRAMIDS

Purpose: Mixed practice  
 Place: Classroom  
 Number: Entire class  
 Equipment: Pencil and paper

Children are given the material on the left side of the equal signs and are asked to build the rest of the pyramid. Three complete pyramids are given below.

$$\begin{aligned} 1 \times 8 + 1 &= 9 \\ 12 \times 8 + 2 &= 98 \\ 123 \times 8 + 3 &= 987 \\ 1234 \times 8 + 4 &= 9876 \\ 12345 \times 8 + 5 &= 98765 \\ 123456 \times 8 + 6 &= 987654 \\ 1234567 \times 8 + 7 &= 9876543 \\ 12345678 \times 8 + 8 &= 98765432 \\ 123456789 \times 8 + 9 &= 987654321 \end{aligned}$$

$$\begin{aligned} 1 \times 9 + 2 &= 11 \\ 12 \times 9 + 3 &= 111 \\ 123 \times 9 + 4 &= 1111 \\ 1234 \times 9 + 5 &= 11111 \\ 12345 \times 9 + 6 &= 111111 \\ 123456 \times 9 + 7 &= 1111111 \\ 1234567 \times 9 + 8 &= 11111111 \\ 12345678 \times 9 + 9 &= 111111111 \\ 123456789 \times 9 + 10 &= 1111111111 \end{aligned}$$

$$\begin{aligned} 9 \times 9 + 7 &= 88 \\ 98 \times 9 + 6 &= 888 \\ 987 \times 9 + 5 &= 8888 \\ 9876 \times 9 + 4 &= 88888 \\ 98765 \times 9 + 3 &= 888888 \\ 987654 \times 9 + 2 &= 8888888 \\ 9876543 \times 9 + 1 &= 88888888 \\ 98765432 \times 9 + 0 &= 888888888 \end{aligned}$$

## THINK OF A NUMBER

Purpose: Mixed practice

Place: Classroom

Number: Six or eight

Equipment: None

Alice: Think of a number.

John: O. K.

Alice: Add seven.

John: O. K.

Alice: Double the number you now have.

John: O. K.

Alice: Subtract 4.

John: O. K.

Alice: What is your number now?

John: Thirty-eight.

Alice: The number you thought of was 14.

John: How did you know?

Answer: Alice merely divided 38 by 2 and subtracted 5.

North, Robert, TOWN AND COUNTRY GAMES, Thomas Y. Crowell Company,

New York, 1947

## THE THREE THREES

Purpose: Mixed practice  
Place: Classroom  
Numbers: Entire class  
Equipment: Pencil and paper

Put three 3's together to make 4; to make 11; to make 3;  
to make 36; to make 30.

Answer:

$$3 \frac{3}{3}$$

$$33 \div 3$$

$$\frac{3}{3} \times 3$$

$$33 + 3$$

$$33 - 3$$

North, Robert, TOWN AND COUNTRY GAMES, Thomas Y. Crowell Company,  
New York, 1947



## THE BOOKWORM

Purpose: Practice in adding fractions - clear thinking

Place: The classroom

Number: Entire class may play

Equipment: None

A friend gave you a three volume set of works of your favorite author for Christmas. You were too busy with winter sports, just then, to read the books, so you set them in order on your bookshelf - Vol. I, Vol. II, Vol. III. You measured their thickness carefully before doing so, and discovered that each book was exactly  $1\frac{1}{2}$  inches thick. One inch of this was the text itself, and  $\frac{1}{2}$  inch was the thickness of the two covers - that is, each cover was  $\frac{1}{4}$  inch thick.

Now, some months later you discovered that a bookworm had eaten his way through the books from page one of the first volume to the last page of the third volume. How far did he travel?

Answer: Two inches. He went through the front cover only of Vol. I, the text and both covers of Vol. II, and the back cover only of Vol. III.

North, Robert, TOWN AND COUNTRY GAMES, Thomas Y. Crowell Company,

New York, 1947

## RIDDLE IN RHYME

Purpose: To be used after study of Roman numerals  
Place: Classroom  
Number: Entire class  
Equipment: None

There is a word of  
Letters four;  
Take two away,  
You've four once more;  
And then, as sure as  
I'm alive,  
Take three away--  
And you'll have five!

Answer: Subtract the letters from FIVE to leave IV and V.

Boston Sunday Globe, November 16, 1952

**NUMBER PUZZLE FUN**

**Purpose:** Mixed practice (mental)

**Place:** Classroom

**Number:** Entire class

**Equipment:** None

Take the number that rhymes with you.

Multiply it by the rhyme of free.

Add it to the rhyme of door.

Then subtract the rhyme of shoe.

Divide this by the rhyme of more.

And add to this the rhyme of tree.

Divide this by the rhyme of dive--

The answer you get will rhyme with gun.

--Erne Levins

Instructor Magazine, September 1952, published by the

F. A. Owen Publishing Company, Instructor Park, Dansville, N. Y.

### SECTION C - HANDWORK

In this section are a few examples of handwork which give practice in measuring. Limitless other examples can be found by the classroom teacher.

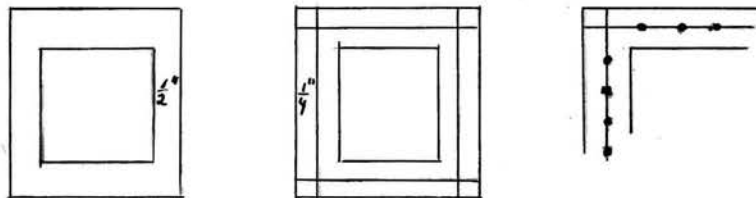
## HAND LOOM

## Materials:

Piece of  $\frac{1}{4}$ " plywood,  $3\frac{1}{2}$ " x  $3\frac{1}{2}$ "  
 44 wire brads,  $\frac{1}{2}$ " long  
 3/0 sandpaper  
 Large needle  
 Hammer  
 Hand drill  
 Coping saw  
 Wool yarn

Mark  $\frac{1}{2}$ " border on plywood. Cut out center section. Sandpaper smooth.

Mark a line  $\frac{1}{4}$ " from edge all around. Divide each side into  $\frac{1}{4}$ " spaces. Drive wire brad into each  $\frac{1}{4}$ " mark, 11 brads on each side, none at the corners. Your loom is now ready to use.



Zarchy, Harry, LET'S MAKE SOMETHING, Alfred A. Knopf, New York,

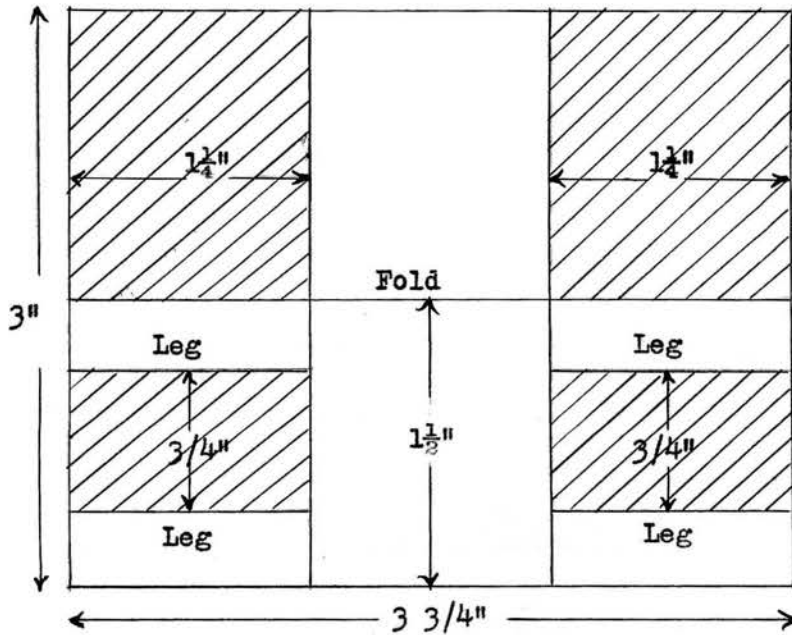
N. Y., 1941

## DOLL'S CHAIR

## Materials:

Heavy construction paper  
 Ruler  
 Pencil  
 Paints  
 Scissors

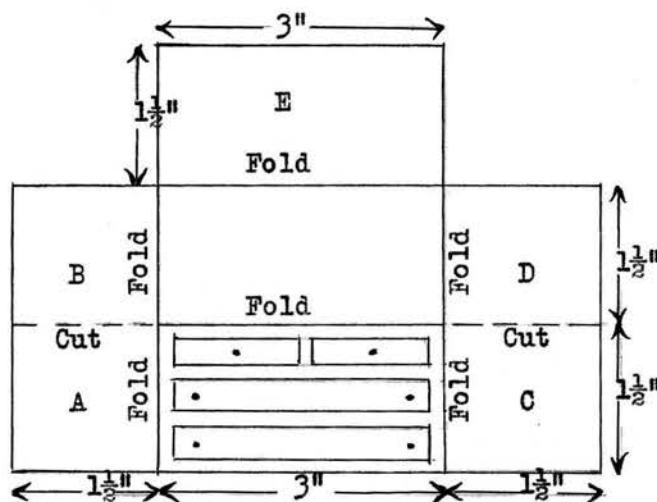
Measure and cut away shaded areas as in diagram. Fold legs down and back up. Paint if you want to. You can make another chair like this and paste rockers on it for a rocking chair.



## DOLL'S CHEST

## Materials

Heavy construction paper  
 Paste  
 Crayons or water colors  
 Ruler  
 Pencil  
 Scotch tape or gummed paper



Paint or color drawers on chest. Measure, fold, cut as in diagram.

Paste A on B. Paste C on D. Fold down E. Use sticky tape from the inside to hold E in place.

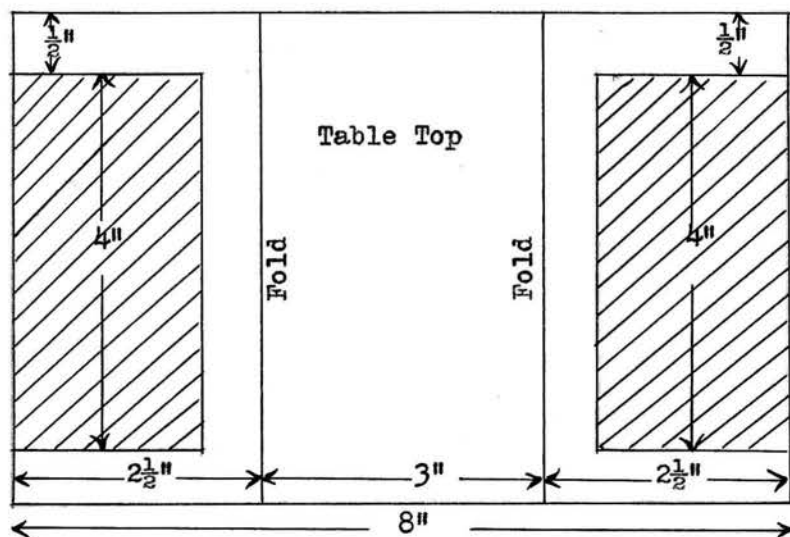
## DOLL'S TABLE

## Materials:

Heavy construction paper  
Ruler  
Pencil  
Scissors

Fold and cut after careful measuring as in diagram.

Paint if you wish.





## SALT BEADS

## Materials:

Salt  
Flour  
Water  
Vegetable Coloring  
Toothpicks  
Measuring cup

Mix together  $\frac{2}{3}$  cup salt,  $\frac{1}{2}$  cup flour,  $\frac{1}{3}$  cup water and 2 or 3 drops of vegetable color. Mix to a dough. Roll a small lump between the palms of your hands. Make a hole through it with a toothpick. Place on waxed paper to dry. When beads are dry, string and coat with colorless shellac or nail polish. Many shapes can be made. If you want to make several strings or bracelets, double the recipe for dough. Bracelets should be strung on elastic thread to go over the hand.

Newkirk, Louis V., and Zutter, Lavada, YOUR CRAFT BOOK, International Textbook Co., Scranton, Penn., 1946

## CORK CASTLE

## Materials:

Large corks  
Knife  
Pencil  
Tissue paper  
Glue

With pen-knife cut out bricks from cork. Bricks should be  $\frac{1}{2}$  inch long,  $\frac{1}{4}$  inch wide and  $\frac{1}{8}$  inch high. Glue the bricks together, either in a square or rounded shape. Leave openings for windows and doors. Glue tissue paper behind window openings.

For the battlement of castle: 1. Cut a large flat cork. Mark off open spaces for parapet. 2. Cut out squares at top for openings of battlement. Corks can be cut easily if you use a sharp knife and rub a little grease on blade before cutting.

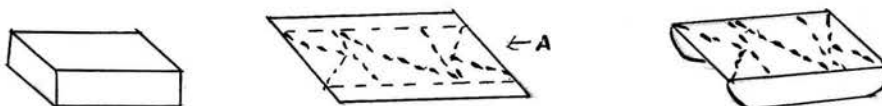
Fletcher, Helen J., THINGS TO MAKE, Paxton-Slade Publishing Corporation, New York, N. Y., 1951

## MATCH BOX COVER

## Materials:

Tin  
Hammer  
Nail  
Ruler  
Pencil

Cut rectangle from tin can as long as match box and  $\frac{1}{2}$  inch wider. Use ruler and pencil to draw design in space A. With nail and hammer make punch marks outlining design. Be careful not to pierce the metal. Make design on border. Cut off corners (see illustration). Bend to fit top of match box tightly.



Zarchy, Henry, LET'S MAKE SOMETHING, Alfred A. Knopf, New York, 1941

## COWBOY SPURS

## Materials:

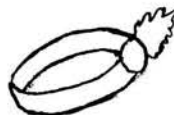
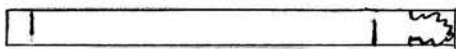
Flexible cardboard  
Paints or crayons  
Silver paper  
Ruler  
Pencil

Cut two strips from cardboard 1 inch wide and 13 inches long.

Make a slit  $\frac{3}{4}$  inch from each end as in the diagram, allowing

$1\frac{1}{2}$  inch at one end for the rowel. Paint spurs a bright color

and cover the rowel with the silver paper.



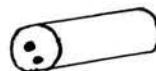
Fletcher, Helen J., THINGS TO MAKE, Paxton-Slade Publishing  
Corporation, New York, N. Y., 1951

## TIN CAN BIRD HOUSE

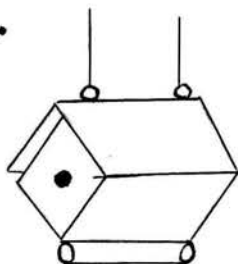
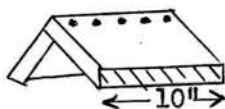
## Materials:

2 pieces of pine  $7/8"$  x  $8"$  x  $10"$   
 2 pieces of pine  $7/8"$  x  $6"$  x  $6"$   
 12 common nails  $1\frac{1}{2}"$  long  
 4 screw eyes  $3/4"$   
 2 wood screws  $3/4"$   
 Paint brush  
 Hammer  
 Screw driver

Use nail to punch two holes in bottom of tin can.



From inside, fasten can to center of  $6"$  square board. Use  $3/4"$  screws. Nail two ten inch pieces to form roof. Cut a  $7/8"$  hole in center of remaining  $6"$  piece. Nail to roof. Nail other piece (with can on it) to roof so can fits up against entrance closely. Put screw eyes in top. Put screw eyes in bottom corners and fasten taut with wire as in illustration.



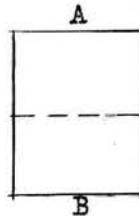
Zarchy, Harry, LET'S MAKE SOMETHING, Alfred A. Knopf, New York,  
 N. Y., 1941

## NAVY HAT

## Materials:

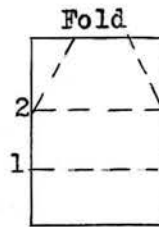
A piece of thin construction paper one and a half times as long as its width--21" x 14" is a good size.

Figure 1



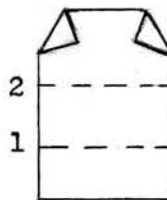
Fold paper in half bringing A to B.

Figure 2



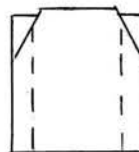
Fold in thirds, 1 and 2, crease and unfold. Fold on diagonal dotted lines.

Figure 3



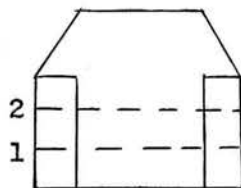
Fold upper sheet on dotted lines, folding first on line 1, then rolling over again to crease on line 2. When whole article over.

Figure 4



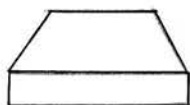
Fold on dotted lines and crease well.

Figure 5



Fold this side on lines 1 and 2 as in figure 3. When completed, tuck ends at top securely into each end of folded band to hold in place.

Figure 6



Open at bottom

Soong, Maying, THE ART OF CHINESE PAPER FOLDING, Harcourt, Brace  
and Company, New York, N. Y. 1948

## SECTION D - A CONCLUDING STATEMENT

In conclusion, it must be emphasized that these games, puzzles, and examples of handwork should be used for practice only after the child has been introduced to the new concept and understands clearly what he is doing. Unless the child understands that two groups of four pencils each equal eight pencils, it is of no value to him to repeat  $2 \times 4 = 8$  in the process of a game.

Using a game that does not appeal to a group, or using the same game repeatedly until it has lost its freshness, defeats the purpose of the game.

As in all teaching, it is well to group children of similar ability, so that the child who responds slowly will not feel inadequate. If a child is very quick in his responses, chances are he will profit from and enjoy a game that is more challenging.

In using these games, it is convenient to write them on 3 x 5 file cards which are filed, not alphabetically, but by page number, corresponding to the page in the text book where a particular game would be useful.



## APPENDIX

INTRODUCTORY STATEMENT - Games, puzzles and riddles, and handwork are listed here under processes, when they will be found useful. Adaptations are also listed.

Addition of Whole Numbers

Around the Circle .....	7
Mine .....	8
Number Eleven .....	9
Thirteens.....	11
Calendar Pitch .....	17
Tic-Tat-Toe .....	20
Bird Catcher .....	25
Crazy Blackboard Arithmetic .....	12
Building Pyramids .....	33
Think of a Number .....	34

Subtraction of Whole Numbers

Around the Circle (Adaptation II)....	7
Mine (Adaptation II).....	8
Crazy Blackboard Arithmetic.....	12
Calendar Pitch .....	17

Multiplication of Whole Numbers

Around the Circle .....	7
Mine (Adaptation II).....	8
Number Eleven (Adaptation).....	9
Mathematical Baseball .....	10

Multiplication of Whole Numbers (cont.)

Thirteens.....	11
Crazy Blackboard Arithmetic.....	12
Magic Puzzle.....	32
Building Pyramids.....	33

Division of Whole Numbers

Around the Circle (Adaptation III)....	7
Mine (Adaptation III).....	8

Reducing Fractions to Lowest Terms

Attention Run.....	14
Fractional Old Maid.....	15
Black Circles.....	18
Lawyer, Lawyer.....	22
Tony Says.....	23
Brothers.....	26

Changing Improper Fractions to Mixed Numbers

Hot Potatoes.....	16
Black Circles.....	18
Lawyer, Lawyer (Adaptation I).....	22
Tony Says (Adaptation).....	23
Brothers (Adaptation I).....	26
Catch and Answer.....	24

Adding Common Fractions

Around the Circle (Adaptation IV).....	7
Fractional Old Maid.....	15
How Much Time Have You?.....	21
The Bookworm.....	36

Recognizing Decimal-Common Fraction Equivalents

Mine (Adaptation IV).....	8
Mathematical Baseball (Adaptation I)..	10
Attention Run (Adaptation).....	14
Hot Potatoes (Adaptation).....	16
Catch and Answer (Adaptation).....	24

Recognizing Common Fraction-Per Cent Equivalents

Mine (Adaptation IV).....	8
Attention Run (Adaptation).....	14
Lawyer, Lawyer (Adaptation II).....	22
Brothers (Adaptation II).....	26

Adding Decimal Fractions

Mathematical Baseball (Adaptation II).	10
Fractional Old Maid (Adaptation II)...	15
Bean Bag Bowling.....	28

Multiplying Decimal Fractions

Around the Circle (Adaptation V)..... 7

Practice in Estimating

Morra..... 29

Peggy..... 30

BIBLIOGRAPHY  
Arithmetic Textbooks

- Brueckner, L., Grossnickle, F., Merton, E., Arithmetic We Use,  
J. C. Winston, Chicago, 1948 (Bk. 5)
- Brueckner, L., Grossnickle, F., Merton, E., Arithmetic We Use,  
J. C. Winston, Chicago, 1948 (Bk. 6)
- Buswell, G., Brownell, W., John, L., Daily-Life Arithmetics,  
Ginn & Co., Boston, 1938 (Bk. 2)
- Carpenter, D., Sauer, E., Anderson, G., The World of Numbers,  
The Macmillan Co., New York, 1950
- Clark, J., Otis, A., Hatton, C., Modern School Arithmetic, World  
Book Co., Yonkers-on-Hudson, N. Y., 1937 (Gr. 5)
- Clark, J., Otis, A., Hatton, C., Modern School Arithmetic, World  
Book Co., Yonkers-on-Hudson, N. Y., 1937 (Gr. 6)
- Douglass, H., Kinney, L., Lentz, D., Everyday Arithmetic, Henry  
Holt & Co., New York, 1950 (Jr. Bk I)
- Gorton, A., Lynch, L., Seelye, B., Improving Your Arithmetic,  
Noble & Noble Publishing, Inc., New York, 1946 (Bk. I)
- Knight, F. B., Studebaker, J. W., Ruch, G. M., Study Arithmetics,  
Scott Foresman & Co., New York, 1948 (Bk. 5)
- Knight, F. B., Studebaker, J. W., Ruch, G. M., Study Arithmetics,  
Scott Foresman & Co., New York, 1948 (Bk. 6 )
- Strayer, G., Upton, C., Social Utility Arithmetics, American Book  
Co., Boston, 1939
- Van Tuyl, G. H., Practical Arithmetic, American Book Co., New York,  
1932

## Recreation Books

- Breen, Mary, The Children's Party Book, Grosset and Dunlap,  
New York, 1941
- Cleveland, Robert, Fun for Boys and Girls, Greenberg, New York, 1942
- Fletcher, Helen J., Things to Make, Paxton-Slade Publishing Corp.,  
New York, 1951
- Hansler, F., The Complete Book of Children's Parties, Garden City  
Pub. Co., Garden City, N. Y., 1949
- Mason, Bernard S., and Mitchell, Elmer D., Social Games for  
Recreation, A. S. Barnes and Co., Inc., New York, 1935
- Mulac, Margaret E., and Holmes, Marian S., The School Game Book,  
Harper and Brothers, New York 1950
- Newkirk, Louis V., and Zutter, Lavada, Your Craft Book, International  
Textbook Co., Scranton, Penn., 1946
- North, Robert, Town and Country Games, Thomas Y. Crowell Company,  
New York, 1947
- Smith, David E. et al, Teachers College Record, November 1912,  
13:385-495
- Staley, S. C., Games, Contests, and Relays, A. S. Barnes and  
Company, Inc., New York, 1949
- Soong, Mayling, The Art of Chinese Paper Folding, Harcourt, Brace,  
and Co., New York, 1948
- Periodicals
- Instructor Magazine, September 1952, F. A. Owen Publishing Co.,  
Instructor Park, Dansville, New York
- Boston Sunday Globe, November 16, 1952