

fourth edition

MATHCARDGAMES

300 Games for Learning and Enjoying Math

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ABOUT THE AUTHOR

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Dr. Cotter designed the double-sided AL Abacus and wrote the pre-school to fourth grade *RightStart™ Mathematics* program. She also is writing *RightStart™ Geometry* for middle school.

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Printed in the United States of America

Copies may be ordered from:

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Fourth Edition: November 2006

ISBN 978-1-931980-23-4

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INTRODUCTION

Mathematics is a fundamental force in this technological and information age. The field has doubled in the last thirty years. It is critically important that every child master mathematics to become a productive member of society and an informed citizen. It is unfortunate when a person cannot pursue a desired career because of a lack of the necessary background in mathematics.

Mathematics education has alternated between teaching by rote and teaching for understanding. Rote learning is high maintenance and has led to one-third of the school year being spent reviewing. Many people with learning disabilities, about one out of seven, find rote memorization extremely difficult and cannot rote memorize 400 facts. Even though teaching for understanding takes more time initially, much less time needs to be spent in review. Students who understand math retain it longer, can apply it to new situations, and have a greater chance to succeed in advanced math courses.

This manual has games for learning all the major concepts of arithmetic with special emphasis on memorizing the facts. Counting for the facts is slow, tedious, and often inaccurate. Recent research shows that songs or rhymes learned to help memorize multiplication tables are stored in the language part of the brain, making them less useful for math. Visual strategies based on fives and tens are quicker and more permanent. These games are a fun and interesting way to learn basic math.

Mindy Holte said, “In our concern about the memorization of math facts or solving problems, we must not forget that the root of mathematical study is the creation of mental pictures in the imagination and manipulating those images and relationships using the power of reason and logic.” The AL abacus, based on fives and tens, is an ideal tool for visual learning. I asked five-year-old Stan how much 11 plus 6 is. When he said 17, I asked him how he knew. He explained by saying, “I have the abacus in my mind.” This fourth edition eliminates the “dot strips” that were used in earlier editions and uses the abacus more.

WHY PLAY GAMES

When a child learns to read, she can practice those skills by reading for pleasure. In the same way, these card games combine practice with pleasure. Although learning math requires hard work, it need not be unpleasant. When a person is interested in and loves his work, he can more easily tackle the distasteful segments found in any activity.

These games allow adults and children of various ages and abilities to play together. It does away with anxiety-producing flash cards, which cast the parent or teacher in the role of judge. The only person who enjoys flash cards is the person who doesn't need them. Games create a stress-free atmosphere that allows all to learn at their own pace. And the parent or teacher becomes a partner in the learning process.

There is another reason to make mathematics enjoyable for children. Along with the information recorded in our memories are the feelings we experienced when we learned it. These feelings are recalled along with the fact or experience. For this reason, information stored with negative feelings tends to be forgotten. Therefore, it is important that learning be a pleasant experience. When children recall feelings of discovery and success, they will want to continue learning and will apply that knowledge to other areas. However, children who associate math with feelings of failure and inadequacy will find learning difficult, and worse yet, they will ignore applications to daily life.

THE MATH GAMES

The games teach the players math while they play. The players need not know their facts before playing.

The principles that influenced the design of these games are as follows.

1. A logical and organized approach using visual strategies.
2. Concrete and mental work before paper work.
3. Minimal counting.
4. Manipulatives that are visualizable as well as visual.
5. Concept or strategy explained.
6. Interesting repetition.
7. Some method for error detection.

Rote memorizing is a low-level thinking skill. Strategies, on the other hand, give children confidence and independence. An example of a strategy is finding $9 + 6$ by taking 1 from the 6 and giving it to the 9 to make 10 and 5, which is 15. Children who learn strategies have better number sense and are less likely to resort to finger counting.

Manipulatives, such as an abacus or tables, are not to be regarded as crutches. They enable the children to build a mental model, necessary for concept formation. In practice, children will refer to them less and less and finally not at all. Let each child decide when he no longer needs them. Sometimes just the security of having them nearby helps, even if they are not looked at. At the right time, a child may respond to the challenge of playing without them.

What looks like a simple step to us is often several steps for the child. That explains the variety of games. The games progressively get harder, building on previous concepts. The background section found in some of the games offers suggestions for presenting new concepts. Often a concept can be learned in more than one way, resulting in several games for the same concept.

We know how useless it is to have a corrected math paper returned a week later. To be helpful, errors must be corrected immediately. The games allow the players to discover errors themselves or with the help of the other players. Most of the solitaires cannot be won if an error is made.

PLAYING THE GAMES

This manual can be used with any mathematics program. The games provide a way to help both children needing remediation and those needing enrichment. Playing the games over the summer months keeps the players ready to learn more mathematics.

Who can teach

Anyone can play these games with children. Once the children know how to play, they can play by themselves. To help two groups simultaneously, form two circles like a figure eight and sit where the circles join.

You need not be a math expert to teach these games. Any person knowing the most basic arithmetic can do it. Algebra is not a pre-requisite for this book. If you have anxiety when faced with math you will enjoy this approach. It is my hope that after playing a few of the games you will start to enjoy math too.

What is taught

There are eight chapters: Numeration, Addition, Clocks, Multiplication, Money, Subtraction, Division, and Fractions. Within each chapter the beginning games are easy and gradually become harder. The final games in each chapter teach more advanced concepts topics, for example, binary numbers.

It is not necessary or advisable to complete each chapter before starting another topic. The clock games can be played while still playing the addition and the multiplication games. However, to prevent confusion, do not teach the subtraction facts until the child knows all of the addition facts. Likewise, teach the division facts only after the child knows the multiplication facts.

What age

Players of any age will enjoy these games. The beginning chapter of numeration can be used as early as three. Start with an easy game to check skills and build confidence. You can determine the difficulty level of each game by its objective. If you find a game too hard, tell the child, "Let's quit and play a different game."

How many times

Some games will be played many times, others, once or twice. Reviewing old games lets the children see their progress while reinforcing familiar concepts.

Who plays

These are good family games as well as math games. Play can often be with partners to even out the effect of varying abilities and to promote cooperation. Once the children understand a game, they can play by themselves. Older children can play with younger children, benefiting both. You can often make a game more challenging for a more advanced player.

DESCRIPTION OF THE CARDS

To play these games, you need six decks of special cards, which are available from Activities for Learning. The descriptions are below.

Basic Number Cards

The basic number cards are numbered from 0 to 10. There are 12 of each number.

Corner Cards

The Corner cards each have four colored numbers between 1 and 10 along the sides. There are 50 Corner cards, no two alike.

Product Cards

Each card in the product card deck corresponds to a number in the multiplication table from 1×1 to 10×10 . Thus, it has 100 cards. Some numbers, such as 1, are found only once and others, such as 6, are repeated as often as four times.

Clock Cards

There are two identical sets of the clock cards in different colors, each with 24 cards, comprised of numbers from 1 to 12 and from :00 to :55.

Money Cards

Representations of 15 pennies, 9 nickels, 14 dimes, 8 quarters, and 4 half-dollars make up the 50 money cards.

Fraction Cards

There are 75 fraction cards with 20 different fractions and 20 matching percentage cards as follows.

1. Two each of $\frac{4}{5}$, $\frac{7}{10}$, $\frac{9}{10}$.
2. Three each of $\frac{3}{4}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{5}{6}$, $\frac{3}{8}$, $\frac{5}{8}$, $\frac{7}{8}$, $\frac{3}{10}$.

3. Four each of $\frac{2}{3}$, $\frac{1}{8}$, $\frac{1}{10}$.
4. Five each of 1, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$.
5. Eight each of $\frac{1}{2}$.
6. Twenty percentage cards, corresponding to each fraction.

SOME PRACTICAL CONSIDERATIONS

Care of the cards

Before beginning to play, remind the players to take proper care of the cards. Show them the proper way to shuffle; never force cards between other cards—that ruins the edges. With the deck in one hand, pick up from the end about one-third of the cards. Drop some of the cards in front of the other cards. Drop more cards in front of those cards. Continue until all the cards are dropped. Repeat a few more times. Ask the winner of the last game to put the cards away.

Where to play

For the younger players, the preferred place is the floor. Children are more comfortable on the floor and the games seem more informal. A special rug used only for games makes a good playing area.

Families can play the games even while traveling. To keep the cards from slipping in a moving vehicle, place the cards on a piece of felt or terry towel.

The winner

Most of the games are competitive; that is, there is a winner (or loser). Some of the games are activities; the children seem to enjoy these just as much. Most of the competitive games are won by a combination of chance and skill. You can often help a losing player by the way you play your cards.

Occasionally, a child will need help in learning to accept defeat graciously. A few general remarks before playing, such as, “No one can win all the time,” and “We all like to win,” might help. After a child has lost a dozen games or so, losing is rarely a problem.

Incidentally, in games where the winner is decided by the most cards, do not allow the children to count the cards. It takes too much time. Simply put the stacks on a firm surface and see whose stack is highest. By pressing down on the stacks, you can determine to within one card which stack is higher.

To encourage cooperation, suggest the children play with partners or teams. Several children can play a solitaire game (despite the name); they work together trying to “beat the cards.”

The child with learning problems

Often, children with learning disabilities find memorizing unrelated facts very difficult and paper work tedious. These games eliminate both problems and give the child a new approach. Work in a place free from noise and visual distractions. Repeat the games many times. The best way to end a game is “Let’s play it again.”

In conclusion, it is hoped that through these games, the players will develop a lifelong interest and enjoyment in mathematics, thereby enriching their lives. I also hope some of them will become tomorrow’s mathematicians, scientists, and engineers.