

Math Puzzles and Brainteasers Grades 3-5

Over **300** Puzzles that Teach Math
and **Problem-Solving Skills**

TERRY STICKELS

1 2 3 4 5 6 7 8 9 ?



Praise for Math Puzzles and Brainteasers

Terry Stickels combines his masterful ability to create diverse, challenging and just plain fun puzzles with a wide range of math concepts, in a playful way that encourages the solver to discover their own unique methods of finding solutions.

—David Kalvitis, author of *The Greatest Dot-to-Dot Books in the World*

Logical, numerical, spatial/visual, and creative thinking problems can all be found within these covers, embracing a wide spectrum of thinking skills for developing minds. Terry Stickels also encourages indulgence in mathematical play, which for young students is an indispensable component of motivated and successful problem solving.

—Barry R. Clarke, *Mind Gym* compiler,
The Daily Telegraph (UK)

Even kids who are not math nerds will enjoy this book. Stickels hits the perfect mix of brainteasers: They're challenging while still managing to be great fun at the same time!

—Casey Shaw, Creative Director, *USA WEEKEND* magazine

Terry Stickels is clearly this country's Puzzle Laureate. He has concocted a delightful and challenging volume of brainteasers that belong in every math teacher's library. Focused specifically on grades 3–5 and grades 6–8, these puzzles both educate and sharpen children's critical thinking skills. As an award-winning puzzle constructor myself, I am always in awe of what Terry comes up with.

—Sam Bellotto Jr., *Crossdown*

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*MATH PUZZLES
and
BRAINTEASERS,
Grades 3-5*

*Over 300 Puzzles that Teach
Math and Problem-Solving Skills*

Terry Stickels

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Foreword

One of the advantages of growing up in a large extended family is that on numerous occasions I have had the opportunity to observe a miraculous transformation: A young, helpless, and ignorant epsilon—as the mathematician Paul Erdos called young children—comes into the world, begins to eat, drink, cry, dirty his or her diapers, grow (and grow and grow), and, last but not least, assimilate and process information about the world around this new being. Somewhere around the age of three that child becomes a genius.

The idea that all children for a short while in their lives are geniuses has been put forth in both humorous and serious ways by pundits and quipsters galore. The imaginations of children at this young age are unfettered, their preconceptions virtually nonexistent. The names “Plato” and “Socrates,” which appeared on ear tags of stuffed animals of a granddaughter of mine, immediately became “Playdough” and “Soccer-team.” After all, who were these strange Greeks who were impinging on her sovereign right to name her own animals? The animals still would recognize their names, wouldn’t they?

A daughter of mine once politely refused an offering of sauerkraut at a neighbor’s dinner table, saying that she didn’t like “sourcrap.” Another time I found one of my children blithely sitting in an empty laundry basket counting—or at least trying to count—the hundreds of square holes in its sides. The sole purpose of the endeavor apparently was to get some up close and personal information about the basket.

These personal recollections are not intended to impress the readers of this book with the cleverness or cuteness of my own progeny. Everyone who has raised a child or who is growing up will have story after story of their own. Some of these stories will be more humorous than those given here, some will show more intelligence on the part of the children involved, some will reveal unexpected turns of kindness, and some will parody the imperfections and mannerisms of the child's parents. The point is that in the life of every child is a period when that child is highly creative, unassuming, and, in my opinion, highly intelligent. Children look at the world through a pair of magical glasses, wired to, and designed to program the most complicated computer in the world, the human brain.

Then something goes terribly awry. Children gradually become larger physically, a bit more mature mentally, and we set about formally socializing and educating them. They lose their magical glasses and naiveté, and many of the educational processes to which we subject them seem to take on the form of a mass forced-feeding. But then, amazingly, a dozen or so years down the line, we begin to hear comments to the effect that the true geniuses among us, the truly creative people in our midst, are the ones who, for reasons that no one quite understands, have not lost their magical glasses, have not become fully educated in a sense. These elite thinkers are the ones who still see the world—even if it is an adult world they now see—through the eyes of a child.

What has happened to most children in our educational systems, in modern parlance, is a failure to communicate. To be sure, part of this failure is necessary. No new educational theory, no new process or program, no new technological process (at least presently available) will negate all of the negative aspects of having to introduce so much information to so many children in what of necessity has to be a highly organized, almost regimented, manner. But we don't have to throw all of the babies out with the bathwater. We can attempt to fight back.

Enter Terry Stickels and this book. It is a book intended to stem the loss of creativity in the educational process, grades 3 through 5, particularly in mathematics. Mr. Stickels is a highly successful and well-known creator of puzzles, one of the best we have in the country at this time. We need to only casually look at the quantity and variety of puzzles he has created to realize that he is one of those people who has a strong creative force permanently embedded and dispersed within them. He has for certain not lost that childlike ability to look at the world in new ways—and on a daily basis at that. His *FRAME GAME* puzzles, for example—some of which appear in this book—remind me of the way that children create words like “playdough” for “Plato” and “sourcrap” for “sauerkraut.” He is the only adult I know who I believe could compete with children in this regard. And that is a compliment. He has spent a lot of time and energy writing this book and has consulted with various knowledgeable experts concerning the mathematical content.

Advice is given elsewhere on how to use this book, but I would like to throw in my two cents’ worth also. If you are a child reading this Foreword, send Mr. Stickels an e-mail and ask him to write a more advanced book for you. If you are a teacher, a parent, or a friend of a child in the appropriate age group, go ahead and browse, browse, browse. Pick problems that pique your curiosity, ones that turn you on. You will find many. Choose ones that concern the topic of interest at the moment. You will find several. Present these to the children you are concerned with as challenges—challenges to have fun with. Do not present many at once. Even one is sufficient sometimes. And finally, be patient, very patient. Don’t always expect success.

Based on my own experiences in mathematics, I can tell you with certainty that an incorrect analysis of one puzzle, if only you will hang onto your thoughts, might well prove to be the key to solving another one, and actually might well make you appear to be a genius at some later time. No one has to know that most of your thinking came from an unsuccessful attempt with another puzzle!

Getting this idea across to people in general, and to young people in particular, is difficult. But an old cliché in sports does a fairly good job of doing this: It's not whether you win or lose that counts, but how you play the game. The follow-up, in intellectual matters especially, is that how you play the game determines how many games you win in the future.

Again, it merits pointing out that, judging from my contacts with him and the impression he gives of being a workaholic, Terry Stickels has invested an enormous amount of time, physical labor, and highly skilled creative thinking in producing this book. More so than perhaps we realize. Based on numerous conversations with him, I can vouch for the fact he passionately cares about the American educational system. Let's give the gentleman a chance to do what he can with the puzzles he presents here. Here's hoping that this is not the last publication we see from him concerning the training of our young people in mathematics.

February 2009

Dr. Harvy Baker
Department of Mathematics
University of Texas at Arlington

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About This Book

Puzzles and brainteasers are fun ways to get kids enjoying and thinking about math. The “thinking smart” puzzles in this book are designed to sharpen the creativity and problem-solving skills, as well as the mathematics content skills, of students in grades 3 through 5.

The design for the book includes the following objectives:

- Offer a panoramic approach to the thinking skills that kids need to excel in math
- Incorporate a broad spectrum of different kinds of puzzles
- Meet the grade-appropriate guidelines set forth by the National Council of Teachers of Mathematics
- Venture into content areas where previous math/thinking skills books have not gone
- Be challenging, but also offer lots of fun along the way

The puzzles are easy, medium, and difficult, but none are so designated. What one student will find easy, another may find difficult, and vice versa. A difficulty rating also might be intimidating to some students—and interpreted as a good reason for *not* solving a puzzle—the opposite of the book’s purpose.

The range of puzzles incorporates multiple approaches to skill building, including numerical manipulation, spatial/visual problems, and language arts exercises. There is no one “best” pathway to solving each puzzle, and often there are numerous entry points to finding solutions. Students invariably will find the way, using a mix of intuition and thinking skills that are uniquely their own.

The Author

Terry Stickels is dedicated to helping people improve their mental flexibility and creative problem-solving capabilities through puzzles—and making it fun. His books, calendars, card decks, and newspaper columns are filled with clever and challenging exercises that stretch the minds of even the best thinkers. And he especially enjoys creating puzzles for kids.

Terry is well known for his internationally syndicated columns. *FRAME GAMES*, appearing in *USA WEEKEND* magazine, is read by more than 48 million people in six hundred newspapers weekly. *STICKELERS*, published daily by King Features, appears in several of the largest newspapers in America, including the *Washington Post*, the *Chicago-Sun Times*, and the *Seattle Post-Intelligencer*. Terry is also the featured puzzle columnist for *The Guardian* in London—the United Kingdom’s largest newspaper.

As a highly popular public speaker, Terry’s keynote addresses are fast-paced, humorous looks at the ability (and sometimes the lack thereof) to think clearly. Distinguished authorities such as the National Council of Teachers of Mathematics also praise his work as important in assisting students to learn how to think critically and sharpen their problem-solving skills.

Born and raised in Omaha, Nebraska, Terry was given his first puzzle book at age eleven. Fascinated by the book's mind-bending playfulness, he soon was inventing puzzles on his own—lots of them. He attended the University of Nebraska at Omaha on a football scholarship, and while he was at UNO tutoring students in math and physics, he saw the advantages of using puzzles to turbocharge understanding of several concepts within those disciplines.

After several years as an occasionally published creator of puzzles, Terry was asked to produce a weekly column for a twelve-newspaper syndicate in Rochester, New York. Two years later, his puzzles caught the attention of Sterling Publishing in New York, and his first book, *MINDSTRETCHING PUZZLES*, became an immediate hit and is selling well to this day. Twenty-five more puzzle books have followed, three of them sponsored by the high-IQ society MENSA.

Terry lives in Fort Worth, Texas, where he is working on his next generation of puzzles to once again captivate, challenge, and delight his worldwide readership.

Introduction

This book contains more than 300 puzzles, ranging from relatively easy logic challenges to more difficult math brainteasers, requiring math skills ranging from addition and subtraction to determining probability and algebraic thinking. Within these pages you will find these types of puzzles:


Mathematical	Frame Games
Spatial/Visual	Cryptograms
Logical	Analogies
Analytical Reasoning	Sequence
Word Puzzles	Sudoku

By design I have included a large number and broad spectrum of puzzles, providing teachers and learners with multiple options. These are organized into parts devoted to numbers and operations; geometry and measurement; mathematical reasoning; and algebra, statistics, and probability. This arrangement will facilitate the instructor's ability to enhance areas of the curriculum that are most appropriate, adding richness, change of pace, and reinforcement to the teaching/learning process.

Some Puzzle-Solving Tips

Puzzle solving is sometimes like mathematical problem solving, but sometimes you have to move away from the more standard approaches when working on puzzles. Think about the puzzles from different perspectives and with a sense of play. Consider some of the following:

- Can the puzzle be solved by breaking it down into simpler components?
- Are there patterns that repeat often enough to suggest a prediction for “what comes next”?
- A puzzle may have one or more answers.
- Try thinking of ways to “twist, bend, separate, or spin” the puzzle. What does it look like “backward, forward, upside down, and sideways”?
- Does your answer make sense? Can you plug your answer back into the question to satisfy all the parameters?
- If your answer seems strange or unlikely, it may well be correct. The answers to puzzles are often surprising!
- Don’t worry about how you might be seen if you can’t solve the puzzle. We all make mistakes, and no one can answer every question. Just relax, have a good time, and never worry about other people’s opinions.

Projects throughout the book marked with a  symbol can be done using easy-to-find manipulatives, such as coins, blocks, and cut paper, to help learners who may have trouble visualizing some of the puzzles.

You may wonder why some language arts puzzles are included in a math puzzle book. Actually, puzzles and problems such as analogies and analytical reasoning that are more “language arts” in nature promote and augment critical-thinking skills. Take the *FRAME GAMES*, for example. *FRAME GAMES* are words, letters, pictures, fonts, and the like, juxtaposed in a way to reveal a common idiom, famous person, athlete, movie, song title, and similar things. These include components of spatial/visual thinking, language, memory, vocabulary, and lighthearted fun. When people solve even one puzzle correctly—and find the fun in doing so—they are eager to jump to the next challenge, even if it is a puzzle of a different kind. Also, solving a type of puzzle in one area often triggers the mind into a flexible mode that makes it easier to solve problems/puzzles in other areas.

Another appealing feature of the *FRAME GAMES* is that they don’t always follow the standard left-to-right or top-to-bottom pattern for their solutions. Mental flexibility from different perspectives is required. These puzzles can be used in a broad spectrum of classroom situations—from special education to warm-ups in calculus classes. They are placed periodically throughout the book, offering both a mental break and a different type of thinking challenge.

There is no wrong way to use these puzzles. They’re meant to be treated like a good watch or pair of shoes: to be used over and over again. And they never wear out!

Here are some application ideas:

- As warm-ups to introduce a new element of math curriculum
- As a focus for competition among teams
- As an inspiration for learners to create their own versions to share with classmates
- Featured on posters or class newsletters as the puzzle of the day, week, month, or holiday

-
-
- For group problem-solving exercises
 - Sent home for sharing with friends and family
 - As the basis for discussions on how certain puzzles might have real-life applications and how they might be used within various professions
 - Chosen randomly, just for fun!

The options are endless, as the marriage of mathematics and puzzle solving continues to be a winning combination to achieve new levels of accomplishment in elementary school classrooms everywhere. And that, in turn, contributes to developing lifelong learners who enjoy all aspects of the thinking process, as miraculous and ephemeral as it sometimes can be. I'm reminded of the introduction to Martin Gardner's book, *AHA! INSIGHT*,* where the following appears:

Exactly what goes on in a creative person's mind when he or she has a valuable hunch? The truth is nobody knows. It is some kind of mysterious process that no one has so far been able to teach to, or store in, a computer.

*Martin Gardner, *AHA! INSIGHT*, Washington, D.C.: Mathematical Association of America, 2006. Copyright © Martin Gardner, 2006.

$$\square + \square + \triangle + \triangle = \frac{38}{}$$

Part I

NUMBERS and OPERATIONS

TWO
+ TWO

FOUR



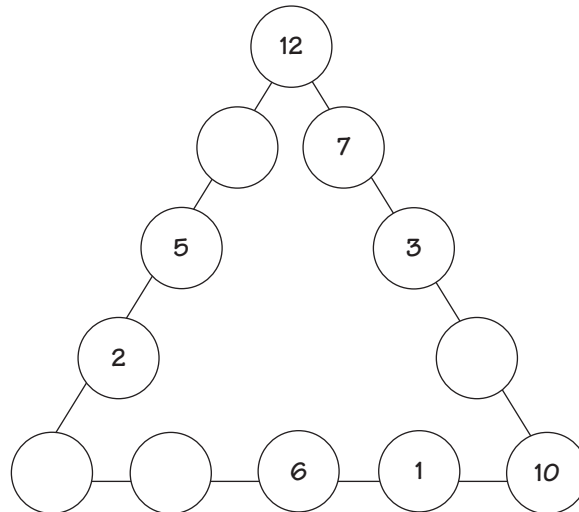
$$L \times IX = ?$$

Whole Numbers

1. What is the next number in the sequence below?

1 4 9 16 25 36 ?

2. Place the numbers 1–12 in the twelve circles below so the sum of each side of the triangle is 36. I will give you a head start by placing some of the numbers for you. (The numbers may be used once only.)



3. My brother has a summer job and earns \$5 an hour. He is going to work 5 hours a day for 5 days a week, and will do this for 5 total weeks.

a. How much money will he make in 1 week?

b. What is the total amount of money that he will earn?

4. Brenda bought a new catcher's mitt for \$75. Her mom saw another mitt that was a better quality glove and cost less, so she bought it for \$60. Brenda sold her first mitt for \$65. A week later, Brenda's mom accidentally threw her new glove in the trash. Brenda found her first mitt for sale a month later for \$50. She bought it back. How much money did Brenda and her mom end up losing on these transactions?

5. Two shapes are each given a value. Each value is a whole number. This whole number is at least 0 and at the most 10.

$$\triangle + \text{pentagon} = 19$$

$$\triangle > \text{pentagon}$$

$$\text{pentagon} = 9$$

Write the value for the following shape.

$$\triangle = \underline{\hspace{2cm}}$$

Once you know the value, do the following exercises by replacing the shape with its value.

a. $\text{pentagon} + \triangle = \underline{\hspace{2cm}}$

b. $\triangle + \text{pentagon} \times \triangle = \underline{100}$

c. $\triangle + \text{pentagon} \times \text{pentagon} = \underline{\hspace{2cm}}$

d. $\triangle + \text{pentagon} \times \triangle - \text{pentagon} = \underline{\hspace{2cm}}$

e. $\triangle \times \triangle - \text{pentagon} = \underline{\hspace{2cm}}$

f. $\text{pentagon} + \text{pentagon} \times \triangle - \triangle = \underline{\hspace{2cm}}$

g. $\text{pentagon} + \text{pentagon} + \triangle + \triangle = \underline{38}$

h. $\triangle + \triangle + \text{pentagon} \times \text{pentagon} = \underline{\hspace{2cm}}$

i. $\triangle \times \triangle \times \text{pentagon} + \text{pentagon} = \underline{\hspace{2cm}}$

j. $\triangle + \text{pentagon} \times \text{pentagon} + \triangle = \underline{\hspace{2cm}}$

