

Math
Tricks

Mental Math Tricks

Vedic Math Tricks

Singapore Math Tricks



1

Elementary Mathematics Book

Core Skills

Contains

- * Addition, Subtraction, Multiply, and Divide Tricks
- * Practice on individual topics
- * Online test papers

Benefits:

Helps kids to solve mathematical problems many times **FASTER**
Helps in making **INTELLIGENT** decisions to both simple and complex problems
It **INCREASES** the concentration of a child
It **REDUCES** the burden of memorizing difficult concepts

Elementary Mathematics: Core Skills (Book 1)

Mathematics core concepts that enhance computational fluency
for TMSCA and Math Olympiad

By: Ice Venkatesh
Author and Founder of Vibba LLC

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Editor: Arti Venkatesh

I am dedicating my first book to my Mathematics Teacher,



Mr. Doug Bell
Mathematics Teacher



THE VILLAGE SCHOOL
A NORD ANGLIA EDUCATION SCHOOL
Houston TX USA

Acknowledgments

This book would not have been possible without the incredible support from Village School, whose belief in my vision fueled my journey. I am deeply grateful to my mom, Arti Venkatesh, for her pivotal role in typesetting the initial draft and for always encouraging me to chase my dreams.

A special acknowledgment to those who have inspired and empowered me to embrace the wonders of mathematics and explore the limitless possibilities it holds. You sparked my passion for mathematical adventures, and for that, I am forever thankful.

To my friends at Village School—you are my constant source of inspiration, reminding me every day of the power of curiosity, perseverance, and friendship. Together, we are changing the way the world sees math!

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Foreword by Bill Delbrugge

Ice Venkatesh has truly inspired us all with her fantastic new math book. Ice has masterfully created a book that breaks down difficult concepts into small steps, helping scholars find success.

Ice has a passion for mathematics and is dedicated to making it accessible to all, which is truly remarkable. As Benjamin Franklin once said, "An investment in knowledge pays the best interest." Through this book, Ice has made a powerful investment, one that will surely inspire countless minds to explore, understand, and appreciate the beauty of math.

Ice, your ability to simplify complex concepts and present them in a way that sparks curiosity and understanding is a gift. This book is more than just a resource; it is a guide that helps learners at all levels unlock the true potential of mathematics. You have transformed math from something that may seem intimidating into a tool that empowers people, encouraging them to think critically and solve problems in new and innovative ways.

Your work will undoubtedly have a lasting impact, providing both students and educators with the knowledge and confidence they need to succeed. Thank you for sharing your love for math with the world and for making this investment in the minds of future generations.

Educationally Yours,
Bill Delbrugge

Head of School, The Village School

Foreword by Cindy Proske

Having started the Village Middle School Math Team in 1996, it warms my heart to see this team not only thriving but producing students like Ice Venkatesh who is willing to share her tips and tricks with other students wanting to participate in math competitions.

The hard work and perseverance, it takes to be successful in math competitions is not an easy task. With Ice's help, other students will be able to have a roadmap to guide them to their success. The math and science team not only helps students solve complex problems, but it gives them a place to form friendships as well as learn about teamwork, perseverance, and the thrill of competition. These skills last a lifetime for these competitors and increase their understanding and skills in the classroom.

I am so proud that Ice Venkatesh will help others embrace the beauty of numbers and the excitement of the challenge. What YOU Do Matters, Ice!

Best Wishes,
Cindy Proske

Director of Middle School, The Village School

Introduction

This is a great book for Middle School students who want to excel and enjoy mathematics. This book will help to improve your problem-solving and critical thinking skills.

To make learning math more engaging and accessible, various innovative methods have been developed, including Vedic Mathematics, Singapore Mathematics, and Mental Mathematics. These approaches are taught in numerous countries around the world, each with unique features and benefits. Core Skills is an extremely easy-to-learn book, filled with such well-known concepts. Let us understand a little bit more about these concepts.

Vedic Mathematics

Vedic Mathematics is an ancient system of Indian mathematics that consists of a set of techniques or "sutras" (aphorisms) to solve mathematical problems in a more straightforward and faster way. These techniques are derived from ancient Indian texts known as the Vedas, specifically the "Atharvaveda". The system was popularized in the 20th century by Jagadguru Swami Bharati Krishna Tirthaji Maharaj, who authored a book titled "Vedic Mathematics" in 1965, which compiled 16 sutras (formulas) and 13 sub-sutras (sub-formulas) that cover a wide range of mathematical concepts.

Key Features of Vedic Mathematics

Simplicity and Speed: The methods in Vedic Mathematics are designed to be simple and enable quick calculations. The concepts are very efficient compared to conventional methods, especially for algebra, geometry, and higher levels.

Versatility: The techniques can be applied to a variety of mathematical problems, including addition, subtraction, multiplication, division, square roots, cube roots, algebraic equations, and complex calculations.

Mental Calculation: Vedic Mathematics emphasizes mental math techniques, encouraging the user to perform calculations in their head without the need for paper or calculators.

Flexibility: There are often multiple ways to solve a problem using Vedic methods, providing flexibility, and encouraging creative approaches.

Pattern Recognition: Vedic Mathematics often involves recognizing patterns and using them to simplify complex calculations. For instance, certain multiplication techniques involve specific patterns that reduce the complexity of the calculation.

Vedic Math Example:

One Vedic Mathematics technique is called "Ekadhikena Purvena," which means "one more than the previous one." This is particularly useful for finding squares of numbers ending in 5. For example, to find the square of 15:

Take the number before 5, which is 1.

Add 1 to it, so $1 + 1 = 2$.

Multiply this sum by the original number before 5, so $2 \times 1 = 2$.

Write 25 at the end. The result is 225.

So, $15^2 = 225$.

Singapore Mathematics

Singapore Mathematics, similar to Vedic Mathematics, focuses on efficiency and understanding and is a teaching method that originates from the national mathematics curriculum of Singapore. It is recognized for its clear and structured approach which aims to develop student's mathematical abilities and problem-solving skills. Here is a brief overview:

Conceptual Understanding: Singapore Math emphasizes a deep understanding of core mathematical concepts rather than rote memorization of procedures.

CPA Approach: It implies the Concrete-Pictorial-Abstract (CPA) approach, where students first use tangible objects to understand a concept (Concrete), then represent these concepts with pictures or diagrams (Pictorial), and finally use mathematical symbols to express the concepts (Abstract).

Problem Solving: Students are taught to solve problems in several ways, using model drawing, number bonds, and mental calculations.

Mastery: The curriculum is designed for students to achieve mastery of a topic before moving on to more complex ideas.

Both Vedic and Singapore Mathematics encourage mental calculation and a deeper understanding of mathematical principles, but they differ in their origins, cultural context, and specific techniques used for teaching and learning mathematics. Singapore Math is adopted in various countries for its effectiveness in teaching mathematics to young learners.

Singapore Math Example:

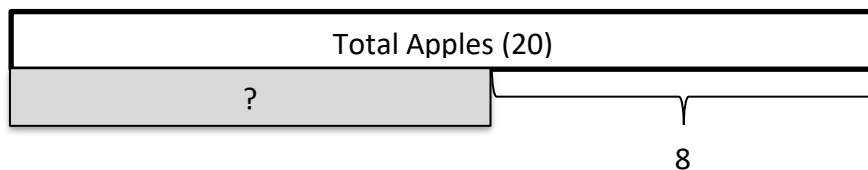
Singapore Mathematics often uses model drawing to solve word problems. For instance, if a problem states that John has 20 apples and gives away 8, how many does he have left? A Singapore Math approach would be to draw a bar model:

Draw a bar and split it into two parts.

Label one part with 20 (total apples) and the other part with 8 (apples given away).

Subtract the second part from the first to find the answer.

John has $20 - 8 = 12$ apples left.



Mental Mathematics:

Mental Mathematics, also known as mental math or mental arithmetic, is the ability to perform mathematical calculations in your head without the use of paper, pencil, or a calculator. It involves using various techniques and strategies to solve math problems quickly and accurately. Here are some key aspects of Mental Mathematics:

Number Sense: Developing a strong understanding of numbers and their relationships.

Mental Strategies: Using techniques like breaking down problems, rounding numbers, and using known facts to simplify calculations.

Practice: Regular practice to improve speed and accuracy in mental calculations.

Applications: Useful in everyday situations like calculating tips, making quick estimates, and solving problems on the spot.

Mental Mathematics is similar to Vedic and Singapore Mathematics and it emphasizes mental agility and efficient problem-solving. It is a valuable skill that can enhance overall mathematical understanding and confidence.

Mental Math Example:

A mental math strategy for multiplication is to break numbers into easier chunks. For example, to find the product of 14 and 5:

Multiply 10 by 5 to get 50.

Multiply 4 by 5 to get 20.

Add the two results together: $50 + 20 = 70$.

So, $14 \times 5 = 70$

Importance of this Book

Math is indeed a foundational subject with a wide array of benefits. It helps develop critical thinking and problem-solving skills, which are essential for academic success but also for navigating everyday life. Here are some ways math skills are applied in daily life:

1. **Critical Thinking:** Math teaches logical reasoning and the ability to approach problems methodically.
2. **Problem-Solving:** Mathematical problems often require identifying patterns, making connections, and applying known methods to new situations.
3. **Attention to Detail:** Solving math problems accurately requires careful attention to detail and precision.
4. **Perseverance:** Working through challenging problems builds resilience and persistence, valuable traits in life.
5. **Practical value:** By incorporating math into everyday activities and other academic subjects, kids can see its practical value and develop a stronger appreciation for the subject.

Who will benefit from this book?

This book is designed to benefit a wide range of students, from those who are just beginning to learn foundational math concepts to those who have developed a passion for mathematics and are looking to prepare for math competitions. It provides a comprehensive and structured approach to learning that caters to the diverse needs and abilities of young learners.

For Beginners

For children at the initial stages of their mathematical journey, this book offers an engaging and accessible introduction to essential math concepts such as Vedic Mathematics, Singapore Math, and Mental Math.

For Advanced Learners

For students who have already developed a strong interest in mathematics, this book serves as a valuable resource to deepen their understanding and enhance their skills. Advanced learners will find challenging problems and sophisticated techniques that push the boundaries of their knowledge and abilities.

Preparing for Math Competitions

This book is an indispensable tool for students aspiring to excel in math competitions. It includes a variety of problem-solving strategies, tips, and tricks that are commonly used in competitive math. The exercises and problems are designed to simulate the types of questions encountered in competitions, providing students with ample practice and exposure.

How to Use Elementary Mathematics: Core Skills (Book 1)

Elementary Mathematics: Core Skills (Book 1) serves as an essential guide, introducing fundamental tricks that lay the groundwork for advanced mathematical understanding. The book is meticulously structured to ensure that children can grasp the underlying concepts and also learn how to effectively solve mathematical problems.

The book is divided into sections, with each section dedicated to explaining concepts that are either similar or help solve similar types of problems. This organization allows for a coherent and logical progression through various mathematical topics, making it easier for students to build on their knowledge as they advance.

Each section encompasses multiple tricks, each designed to simplify and elucidate complex mathematical problems.

To reinforce learning, every trick is accompanied by two examples. These examples provide a visual and practical understanding of the trick, demonstrating its application and effectiveness.

To ensure that students can apply the concepts independently, each trick is followed by five practice problems. These problems are carefully crafted to reinforce the trick and provide ample practice.

At the end of each section, there is a comprehensive quiz covering all the tricks taught within that section. This quiz serves as an assessment tool, allowing students to review and consolidate their understanding of the material.

Additional Resources

Answer sheets for all practice problems and section quizzes are provided at the end of the book. For further convenience and support, these answer sheets are also available on the Vibba website (Vibba.com). This dual availability ensures that students and educators have easy access to the answers, facilitating a smooth learning and teaching experience.

In conclusion, Elementary Mathematics: Core Skills (Book 1) is an invaluable resource for young learners. Its structured approach, clear explanations, and ample practice opportunities ensure that students develop a solid foundation in mathematics. By mastering the tricks and concepts presented in this book, students will be well-prepared for more advanced mathematical studies and problem-solving challenges.

How to use this Book series

This book focuses on Core Skills and tricks required to get started. This book, the first book of the five-book series, is to get started on mathematics tricks.

Tricks Focus area	Core Skills (4th Grade)	Intermediate Skills (5th Grade)	Competent Skills (6th Grade)	Advanced Skills (7th Grade)	Expert Skills (8th Grade)
Addition					
Subtraction					
Multiplication					
Division					
Power					
Square Root					
Table					
Fraction					
Integers					
Complement					
Average					
Factors					
Union					
Set Theory					
Quadratic					
Midpoint					
Triangular					
Base					
Sequence					
Conversion					
Logical Reasoning					
Diagonals					

Each book will give an easy step-by-step approach so that you can understand and memorize how to solve these Mathematics tricks. On average each book will have 25 ~ 35 tricks covering various Mathematics topics with many different and easy-to-master tricks from Vedic Math, Singapore Math, and Mental Math areas.

Path to Expert

Elementary Mathematics: Core Skills (Book 1) is the starting point for a kid to excel in Mathematics, one of the key components for STEM (Science, Technology, Engineering, and Mathematics) education. Besides this physical book, you can access our website (<https://Vibba.com>) which provides in-depth online classes for kids who want to excel in math with all these tricks. These tricks will help kids get a head start in TMSCA, AMC, Math Counts, and Texas Math League and excel in their educational journey.

Section 1

1-A1: Addition using Mental MATH

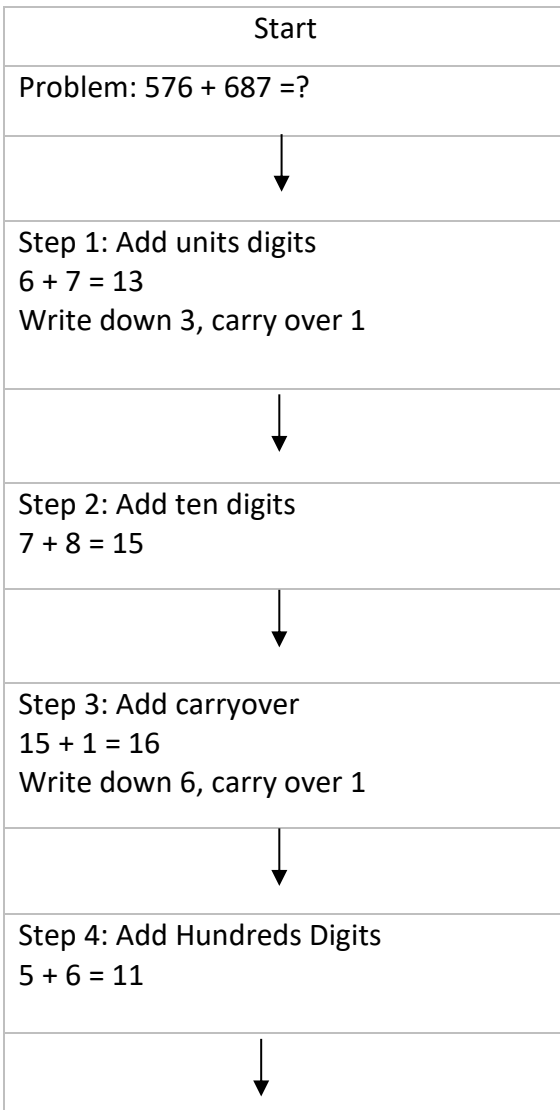
When:

Finding the sum of two or three-digit numbers

How:

1. Add units digits.
2. Add tens digits plus the remainder if any.
3. Add hundreds digits plus any remainder if any.

Visual Flow:



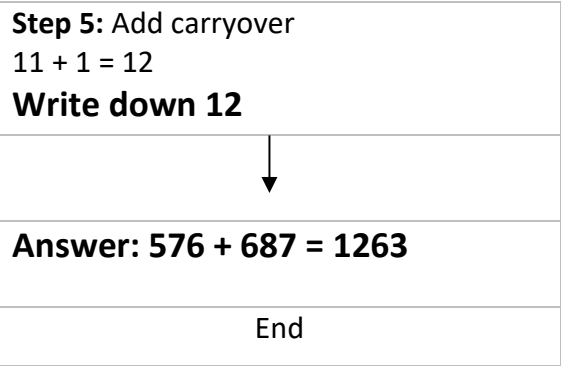


Figure 1: 1-A1: Addition using Mental MATH Visual Flow

Example and Practice Questions

Example 1	Practice Questions
Problem: $576 + 687 = ?$ Step 1: $6 + 7 = 13$ Step 2: $7 + 8 = 15 + 1 = 16$ Step 3: $5 + 6 = 11 + 1 = 12$ Answer: $576 + 687 = 1263$	1. $457 + 232 =$ 2. $869 + 542 =$ 3. $385 + 809 =$ 4. $215 + 975 =$ 5. $748 + 932 =$
Example 2	
Problem: $576 + 687 = ?$ Step 1: $6 + 7 = 13$ Step 2: $7 + 8 = 15 + 1 = 16$ Step 3: $5 + 6 = 11 + 1 = 12$ Answer: $576 + 687 = 1263$	

Table 1-A1: Addition using Mental Math

1-S1: Subtraction Method 1

When:

Finding the difference of a multiple of 10 and a number

How:

1. Subtract the last digit from 10.
2. Subtract all other digits from 9.

Visual Flow:

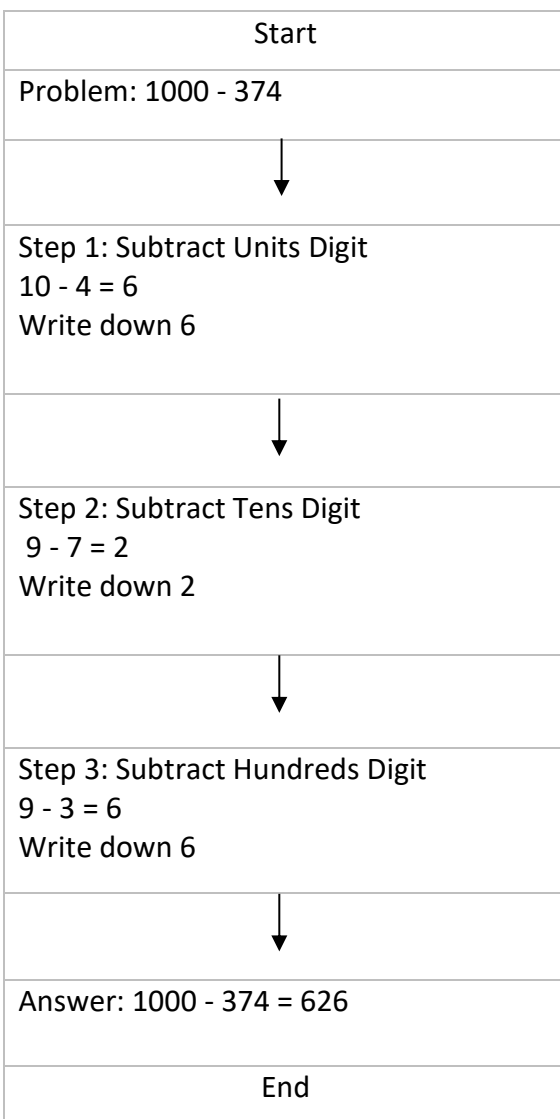


Figure 2: 1-S1: Subtraction Method 1 Visual Flow

Example and Practice Questions

Example 1	Practice Questions
Problem: $1000 - 374$ Step 1: $10 - 4 = 6$ Step 2: $9 - 7 = 2$ Step 3: $9 - 3 = 6$ Answer: $1000 - 374 = 626$	1. $1000 - 785 =$ 2. $1000 - 395 =$ 3. $10000 - 4093 =$ 4. $10000 - 8237 =$ 5. $10000 - 9833 =$
Example 2	
Problem: $10000 - 5748 = ?$ Step 1: $10 - 8 = 2$ Step 2: $9 - 4 = 5$ Step 3: $9 - 7 = 2$ Step 4: $9 - 5 = 4$ Answer: $10000 - 5748 = 4252$	

Table 2:1-S1: Subtraction Method 1

1-S2: Subtraction Method 2

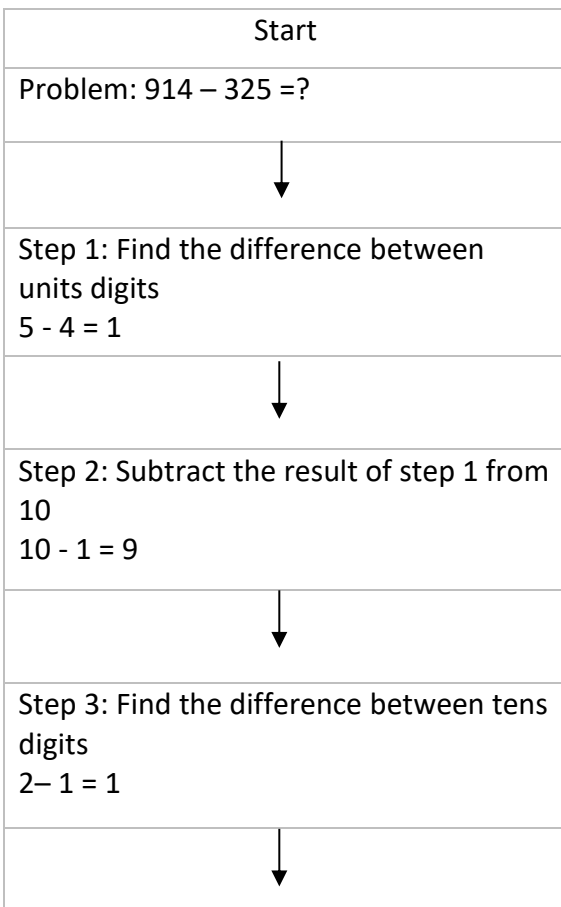
When:

Need to find the difference between the two numbers.

How:

1. Take the difference of two units digits.
2. Subtract that from ten.
3. Take the difference between the tens digits.
4. Subtract that from 9.
5. Take the difference between the hundreds digits.
6. Subtract that from 9.
7. Keep continuing till the second to last digit.
8. On the last digit, find the difference between the two numbers.
9. Subtract one from that difference.

Visual Flow:



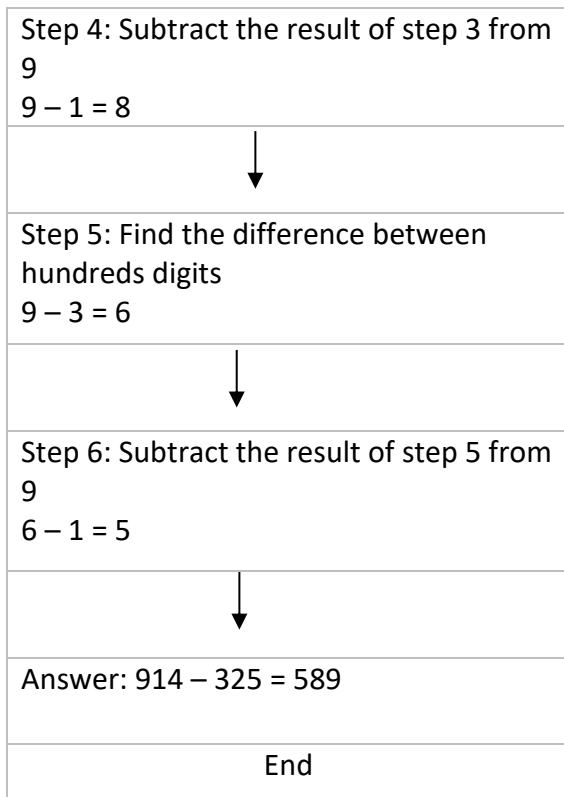


Figure 3: 1-S2: Subtraction Method 2 Visual Flow

Example and Practice Questions

Example 1	Practice Questions
Problem: $743 - 469 =$ Step 1: $9 - 3 = 6$ Step 2: $10 - 6 = 4$ Step 3: $6 - 4 = 2$ Step 4: $9 - 2 = 7$ Step 5: $7 - 4 = 3$ Step 6: $3 - 1 = 2$ Answer: $743 - 469 = 274$	1. $785 - 234 =$ 2. $395 - 224 =$ 3. $893 - 228 =$ 4. $658 - 249 =$ 5. $833 - 287 =$
Example 2	
Problem: $934 - 325 =$ Step 1: $5 - 4 = 1$ Step 2: $10 - 1 = 9$ Step 3: $3 - 2 = 1$ Step 4: $1 - 1 = 0$ Step 5: $9 - 3 = 6$ Answer: $934 - 325 = 609$	

Table 3:1-S2: Subtraction Method 2

