# Right-Brained Addition & Subtraction

Vol. 2

## Adding & Subtracting Multi-Digit Numbers

Build on skills taught in *Right-Brained Addition & Subtraction, Vol 1*

a **Forget Memorization** book

*Learning through images, stories, hands-on activities, and patterns*

by Sarah K Major

www.child1st.com

Right-Brained Addition & Subtraction, Vol 2



ISBN: 978-1-947484-12-2

Printed in the United States of America



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# ABOUT THIS BOOK

This book is for children who are strongly visual, who learn all at once through pictures, are drawn to patterns, rely on body motions, and who need to understand the process behind each math problem they solve. Child1st teaching and learning resources all follow the principle of conveying teaching using a variety of right-brain-friendly elements. We take learning concepts that utilize symbols (numbers and letters) and abstractions, which are left-brained, and embed them in right-brained elements to beautifully integrate the left and right hemispheres in the brain.

## Right-brained Elements:

1- We embed symbols in **VISUALS** so that the child can take a quick look, absorb the learning piece, and store it as an image to be retrieved intact later.

2- We use **PERSONIFICATION** which is a powerful element in teaching and learning. The use of personification makes for rapid learning because the very look and personality of the character conveys the substance of the learning. For example, in this book, dot patterns take on the characters of a bear's face, a high chair, a row of bushes, etc.

3- We rely on **PATTERN DISCOVERY** as a way of making numbers come alive and as a means of conveying the amazing relationships between numbers. What results is number sense. Because the brain is a pattern seeking organ, it is drawn to material that follows patterns. It is my desire that through this teaching resource, many children who are overwhelmed or daunted by math might come to truly be fascinated by it instead.

4- We use **STORY** to contain and convey the meaning of what we are teaching. Stories, like visuals, make learning unforgettable. They explain the "why" behind math concepts and tie everything together, creating a vehicle for meaning and for recall.

5- We use **BODY MOTION**—both gesture and whole body movement that mirrors the symbol shape or the action in the math story (such as addition or subtraction). Again, body movement is a powerful agent for learning and remembering. For many people, body motion makes recall effortless if the idea in the lesson is directly tied to a unique motion.

6- We employ **VISUALIZATION**—a powerful tool for right-brain-dominant learners. If these learners are given time to transfer the image on the paper in front of them to their brains (prompt them to close their eyes and SEE it in their mind's eye), they will be able to retrieve that image later. If the image contains learning concepts, this is how they will remember what you want them to learn. So in this book, each time a visual is introduced, prompt the student(s) to "see" the image in their mind, eyes closed.

# HOW TO USE THIS BOOK

Because this book builds on *Right-Brained Addition & Subtraction*, *Vol 1*, please familiarize yourself with Chapters 2-4 of that book first, including "Good Practice," "Assessments," "Visual Imprinting," and "Learning Numbers." You should also be familiar with the 5-Frames, "My Two Hands," and Stony Brook Village.

**For students just finishing Vol 1**, who are fluent with computation to 10, skip to Chapter 3 to begin new material.

**For students unfamiliar with Right-Brained computation,** teach Book 1 Chapters 5-7 before beginning this book.

**For students needing a review of Book 1**, skip to Chapter 2 for a quick review of Book 1. Make sure the children are completely fluent with computation to 10 before beginning this book.

**For remediation**, determine whether the students lack skills in computation to 10. If they do, use Chapter 2 of this book first, or if they need more practice, use Vol 1, Chapters 5-7.

## GLOBAL VIEW of Right-Brained Place Value

The following table outlines the contents of this book, with a brief explanation of the focus of each chapter.

| Chapter | Content |
|---|---|
| **Chapter 1:** *How Children Learn* | **Who is targeted and why:**<br>Identifying the children who have difficulty with math and ways to address this difficulty. |
| **Chapter 2:** *Prerequisite Skills* | **Prior knowledge:**<br>Identifying students' background knowledge and reviewing foundational concepts before moving into multi-digit computation. |
| **Chapter 3:** *Place Value* | **Teaching place value to young ones:**<br>Presenting a hands-on, whole-body method of teaching place value that draws on real-world applications. |
| **Chapter 4:** *Computation Using Place-Value Mats* | **Practicing place value on mats:**<br>Using real materials as a class or in small groups to gain fluency in understanding and using place value. |
| **Chapter 5:** *A Bird's-Eye View* | **Looking globally at all problems through 20:**<br>Identifying problems and their place within the global whole of computation over 10; working with problems children already know; identifying problems yet to be mastered. |
| **Chapter 6:** *Make a 10* | **Learning a method of addition over 10 based on place value:**<br>Working with addition problems that require making a ten, using real materials and building on prior knowledge of computation to 10. |
| **Chapter 7:** *Take from 10* | **Learning a method of subtraction based on place value:**<br>Working with subtraction problems that require taking a ten, using real materials and building on prior knowledge of computation to 10. |
| **Chapter 8:** *Taking Stock* | **Assessing fluency with new concepts:**<br>Thoroughly reviewing all newly learned material to determine mastery. |
| **Chapter 9:** *To the Top!* | **Extending the method for all multi-digit numbers:**<br>Using this method for all numbers, for those students who want to learn more. |
| Appendix A: | **Activities & Resources:**<br>All materials necessary to implement the lessons in the book. |
| Appendix B: | **Monitoring forms:**<br>Reproducible forms for tracking individual students and whole-class progress, geared to the content of each chapter. |
| Appendix C: | **Answer Keys** |



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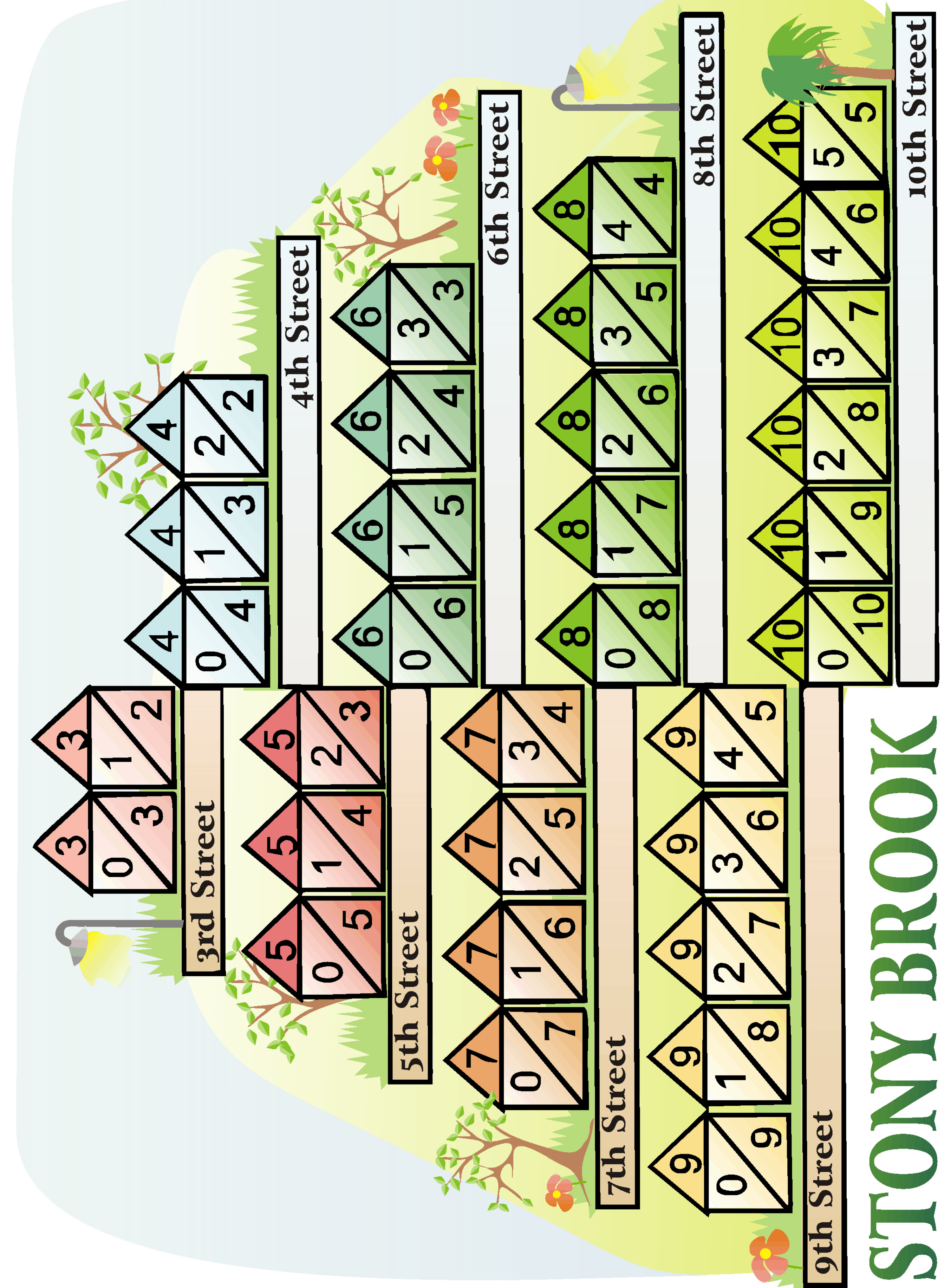
## CHART of LEARNING STYLES

| Traditional Methods are designed for these learners | but not for these learners! |
|---|---|
| **How do I learn? (Dr. Anthony F. Gregorc)** | |
| **I perceive the world** | |
| **Concrete**<br>I use my senses to take in data about the world.<br>What I see is what is real to me. | **Abstract**<br>I visualize, intuit, imagine, read between the lines, and make connections.<br>I pick up subtle clues. |
| **I order the information I perceive** | |
| **Sequential**<br>I organize my thoughts in a linear, step-by-step manner.<br>I prefer to follow a plan. | **Random**<br>I organize my thoughts in segments. I will probably skip details and even whole steps, but I will still reach the goal. I like to make up my own steps. |
| **How do I remember? (Raymond Swassing & Walter Barbe)** | |
| **Auditory**<br>I listen to directions.<br>I need to hear the sounds. | **Visual**<br>I need to see it. I make visual associations, mental maps or pictures, and see patterns.<br><br>**Kinesthetic**<br>I remember well what I learn through my body. I learn best by actually doing the job. |
| **How do I understand? (Herman Witkin)** | |
| **Analytic**<br>I am good with details, can follow steps and hear instructions, and like to finish one thing at a time. | **Global**<br>Show me the big picture! I need to see how all the parts fit in. I can hear directions after you show me the goal. |
| **How am I smart? (Howard Gardner)** | |
| **Verbal/Linguistic**<br>I am verbal! I can speak, write, debate, and express myself well through words. IQ tests love me!<br><br>**Logical/Mathematical**<br>I rely heavily on my logic and reasoning to work through problems.<br>I am a whiz on standardized tests. | **Visual/Spatial**<br>Show me a map and I'll have it! I make vivid mental images and can use these to recall associated information. I want to see how something fits into its environment or surroundings.<br><br>**Body/Kinesthetic**<br>I combine thinking with movement. I do well with activities that require precise motions. I learn by doing; my attention follows my movements. |





Global View of Computation to 10 from Vol 1



# INTRODUCTION

My own struggles with math during my elementary years fueled my passion to discover ways of teaching that would result in success for all students.

I grew up saying and therefore believing that I just "didn't have a mathematical mind." I've since learned that my strongly visual and right-brained approach to taking in and processing information is a great enhancement to the understanding of math, *if* I utilize my visual mind in the learning and doing of math.

In graduate school, I experienced full-blown panic when I had to take my math methods class. The only way I could make sense of the problems was to draw pictures of what was going on in them. My panic skyrocketed the night my professor leaned over where I sat hunched, trying to hide the little pictures I was drawing from her view. In spite of my best attempts to cover my paper with both arms, her sharp eyes spied the drawings and she snatched my paper up. Waving it in the air, she bellowed, "Look at what Sarah's doing!" I was mortified, my body chilled, but my face burned and my stomach clenched so tightly I thought I would be sick.

What happened next surprised me. The professor went on to say that the ability to visualize math and to draw pictures of what was happening would make me a good teacher, because most children are very visual and learn better with the use of visuals. She took what to me had always been an embarrassment and pronounced it good. I will never forget that night!

During the past several years, I have worked closely with a wide variety of learners, earnestly desiring to understand what they needed in order to learn efficiently. I made it my mission to figure out the ways children learn best by throwing out any procedure that did not work for all of the students or that shut some of them down, did not hold their interest, or intimidated them in any way. Over time, I learned that there are some basic elements of practice that work with all my students regardless of their individual learning styles.

The methods in the Right-Brained Computation series are the result of working with children while focusing on the question, *"What will make it possible for **all** of them to learn?"* This quest intensified as I worked on my graduate studies in education. At the same time as I worked through content and learning challenges in my "lab" with the children, I was reading about the same learning issues in my classes. The result for me was maximized understanding. I was primarily observing the children, and then I would go to class to try and find explanations for what I saw rather than simply learning from lecture and books and then walking into the classroom to teach from that knowledge. I want to share with you a little bit of what I came away with in the hope that something in this series will support you as you give all your students the experience of success.

I am grateful to the people who together supported this work: my own children, who cheered me on; my students' parents, who believed in me and in their own children; and the professors who let me concentrate on the topics that really interested me. To the children I have worked with, all I can say is, "Thanks for letting me learn from you! You are the best!"

~Sarah Major



# 1 HOW CHILDREN LEARN


To fully understand the value of this method of teaching computation, it is helpful to take the time to look globally at learning styles and how they relate to traditional ways of teaching math. This overview will lead naturally into identifying the factors that are necessary for a teaching approach to be successful for all children, regardless of their learning needs.

The idea of teaching to multiple learning styles could be intimidating. Because this is true, I first provide an orientation to the learning needs children have, and then pull all the ideas together and draw some conclusions that will help to bring the seemingly disparate elements together into one simple plan for good teaching practice.

The chart on page 6 presents an overview of the learning styles that are critical to this discussion. (For in-depth information on these and other learning styles, please refer to Barbe 1985; Gardner 1993; Gregorc 1982; Tobias 1994; and Witkin 1977.) If we imagine that the learning styles on the right side of the chart represent real children in real classrooms, it will become easier to see which children are being "taught around" in traditional methods of teaching.

## LEARNING STYLES IN TRADITIONAL METHODS OF TEACHING MATH

Math is normally taught in tiny steps; students are given seemingly unrelated bits of information to work with or are given steps to memorize for solving problems, typically without time for the student to discover why those steps work. Often there is no real-life application within the problems, as students work solely with paper and pencil, and miss the opportunity to construct meaning for themselves using real objects.

Is it possible to teach math, as seemingly concrete and sequential as it is, in a way that will reach the abstract, random, visual/spatial, kinesthetic, and global students? Or should we continue expecting them to learn in a left-brain manner? It seems more reasonable to change our current practice to fit the children rather than trying to force children to be something they cannot be. Let's make the assumption, then, that we should expand our method of teaching math to encompass and embrace all our students. What we will do in this book is approach computation in a global, visual, kinesthetic, abstract, and random way so that no child is left out!

## THE COMMON DENOMINATOR

I believe that children who are highly visual also tend to be global, somewhat random, and kinesthetic. Visual children see a whole picture, see smaller elements within the whole picture, see their connection to other elements in the whole picture, and tend to remember parts of the picture based on where each part fits into the whole. In addition, highly visual children will move randomly through the picture (or map or pattern) and are often inclined to spatial activities that require tactile skill. Visual children will prefer to see the task done as they learn it, rather than hearing it explained, and will profit from doing the problem themselves. It is important for these children to understand why the formula works by seeing how one action affects other parts within the whole. They might not understand the process the way another student does, but if they are certain of the goal of the lesson, they will invent good steps that make sense to them and allow them to reach the goal.

### Unique Features of the Kid-Friendly Computation Method

1. Students are able to add and subtract multi-digit numbers using the same strategies they learned in Book 1 for computing to ten, including "My Two Hands." For this reason, I studiously avoid terms such as "borrowing" or "carrying." Every step I do is based on adding numbers under ten or subtracting numbers from ten. Carefully limiting the procedures to these basic facts ensures students will be successful in computation with numbers of any size.

2. A critical feature is that rote memorization—whether of answers to problems, steps in solving a problem, or procedures for computation— is avoided at all costs. Memorization is not the answer. Drill and repetition of facts might result in short-term memorization for some students, but not for every one. If you take the time to tie a process, fact, or procedure to a story, long-term recall is much more likely because the procedure is tied to a hook that acts as a trigger for recall.



3. In this book, the actions of adding and subtracting are tied directly to stories from the beginning so that students are able to "see" computation taking place. As a result, they not only understand and remember what is going on, but they also can easily determine which action to use when they are presented with story problems.

4. Computation is introduced using concrete materials in order to add a visual/tactile component, which will boost learning. Having children do the actions of computation using real materials will also cement the procedures in their minds.

5. The reason for the success of the methods in the Right-Brained Computation series is due to the fact that they tap auditory, kinesthetic/tactile, and visual components simultaneously. Whatever I teach, I teach to the ears, eyes, and hands/body using as many vehicles as possible to carry learning concepts into the brain.

6. Assessments are an important component of this program. I believe that the purpose of teaching is to provide all children with the opportunity to master the material and that all children are capable of mastery. Assessments are simply activities that reflect back to us as teachers what we have successfully taught and where reteaching needs to happen. My assessments are often reproductions of worksheets the children have completed during daily lessons which reflect whether the children indeed know the material I have taught them. There is no point, then, in presenting the material in a different format. The children either will or will not know how to do the computation. I often recommend giving a second assessment in order to rule out the possibility that a child who did not do well was simply tired, distracted, or having an "off" day.

7. If a child is unable to correctly complete a portion of the material in an assessment, this is a signal that reteaching needs to occur. Assessments are tools for determining mastery and areas needing reteaching, not means by which to level or sort students. The shift in our thinking, from "grading kids," to leading them to complete mastery of the material, leads to incredible gains in learning. Our belief in our students will result in their belief in themselves, and the outcome of that belief is success without a doubt!

8. I allow, even encourage, students to retake the same test after more practice if they are not satisfied with their performance. I began doing so because many of the children I teach have failed so often that they have given up trying or believing in their ability to learn. The results were unexpected, however. I've had students ask to retake a test not because they didn't pass, but because they wanted to prove it to themselves that they could ace it again, and also because they wanted to score 100%. Recently, after scoring 100% on their test in my classroom, my fourth graders decided to retake the test in their regular classrooms "just for fun." I'm not kidding; those were their words. Allowing retakes not only increases mastery, it (a) increases confidence, (b) raises the students' expectations of themselves from simply passing to becoming fluent and confident with the material, and (c) encourages students to take ownership of their own learning.

## PUTTING IT ALL TOGETHER

Now let's take these ideas and distill from them some basic elements of a good teaching approach that will engage children from both sides of the learning styles chart:

1. **State the goal first**. Explain what the children are going to learn and why it is important. What is the point, the bottom line?

2. **Provide concrete materials** for the children and establish clear but general parameters within which they will work. Then let them manipulate the materials until they can see the action that occurs in a computation and how that action affects the whole.

3. **Discuss with the students what they have discovered** and guide them in drawing conclusions. This step involves pattern detection and exploration. It will be through patterns that they recall specific facts.

4. **Present real-life examples** of using these sums. Use stories whenever you possibly can. Stories help demonstrate to students how math is relevant. They help answer the inevitable question, "When am I ever going to need to know this?"

5. **Allow as much practice** in solving problems as the students need.

6. Don't expect the students to "just remember" anything. Instead, **tie every new concept to a previously learned concept**, using visual and movement cues.

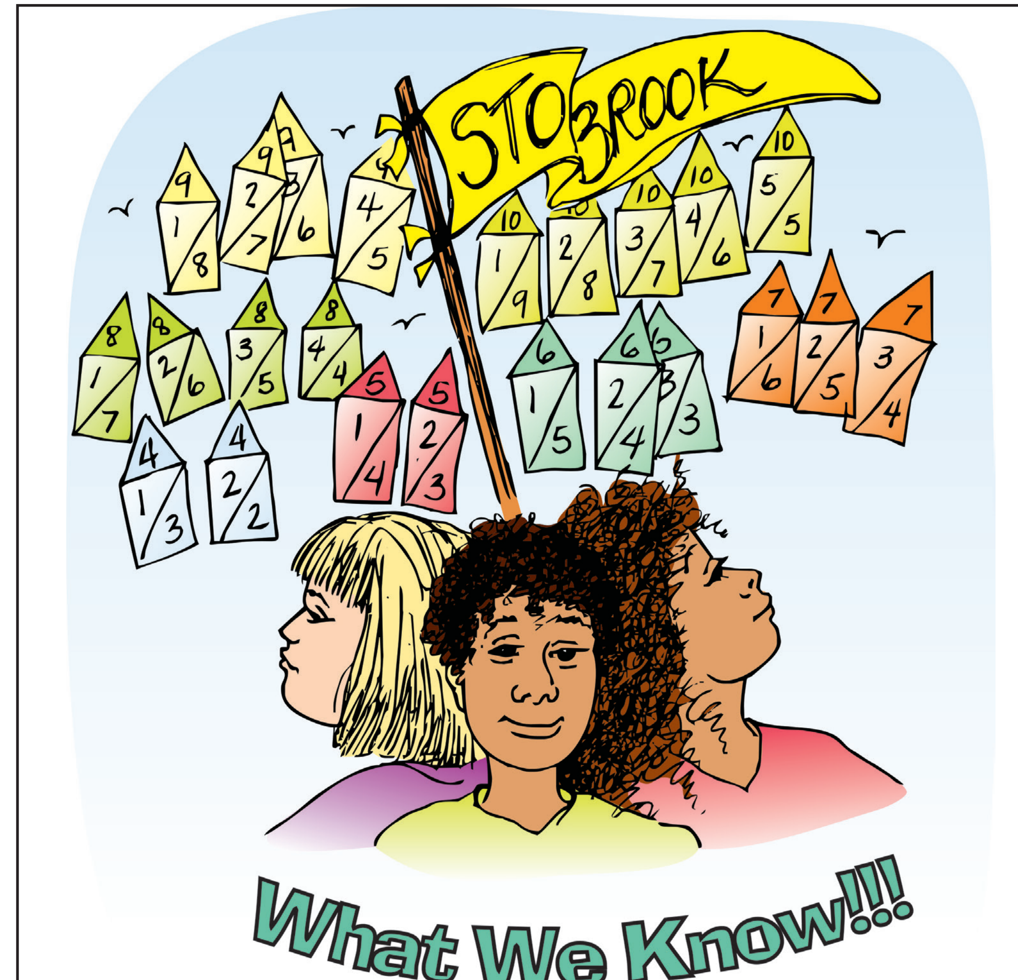
7. **Teach to all three modalities**. But no worries; this book will guide you in that endeavor!



# 2 PREREQUISITE SKILLS

**GOALS FOR THIS CHAPTER**

1. To review the meaning of numbers
2. To review the relationships between numbers
3. To review "My Two Hands," 5-frames, and dot cards
4. To review the number houses to ten




It is important to begin the lessons in this book only after making absolutely sure that all your students are fluent with the number facts of computation to 10. For example, if you show a child the numbers 2 and 5, they should be able to instantly supply the third number in that trio - 7! If 4 and 5, they will supply 9, etc.

The main headings in this chapter correspond to the areas of prior knowledge needed for multi-digit computation. Under each heading are suggested activities. If students have mastered this content, the lessons in this book will go very smoothly for them. To learn multi-digit computation, you will be taking those earlier skills, refining them, and applying them to new situations. For this reason, it is critical to ensure that they are fluent with these background concepts. Even if your students have studied Book 1 (*Right-Brained Addition & Subtraction*) in a prior year, a review will refresh their memories.

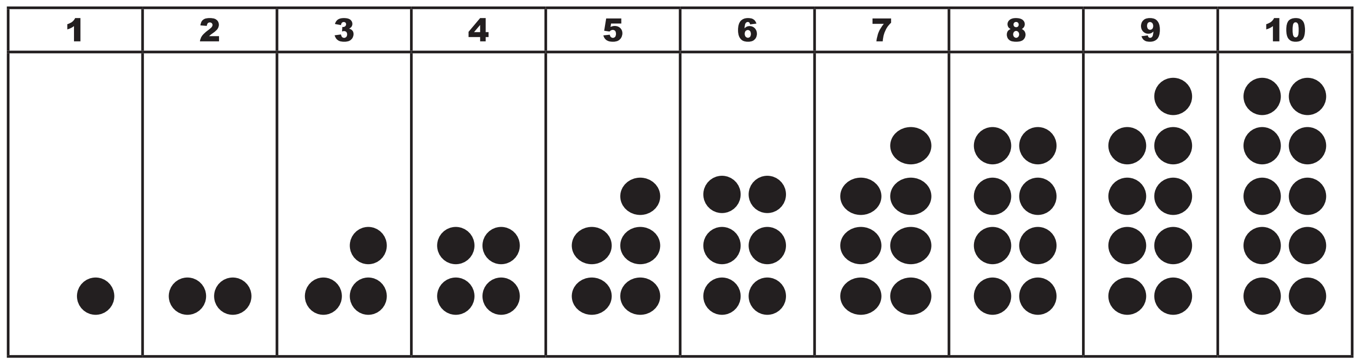
## THE MEANING OF NUMBERS

Begin by laying a visual background for the numbers to ten. The value of visual imprinting is discussed in depth in Book 1, Chapter 4. Your goal is for the children to have a visual image of the quantity each number represents. Using dots to represent the numbers is an effective way to accomplish this (see below).

### Discovery

Locate the dot cards (2.1, page 68) and photocopy them onto transparency film for use with an overhead projector. Also photocopy several sets on paper or card stock and laminate them for use in math centers.

**Display the progression of dots from one to ten:**




Ask the children to talk about what they notice about the numbers. Which groups of dots have similar shapes? Which numbers have an "odd guy" on top? Discover and compare how many pairs of dots each column number has. Identify which numbers have the same number of dot pairs (2 and 3, 4 and 5, and so on). Ask: How many odd numbers are there in our chart? (5) How many even? (5) Why do you suppose that is? How many numbers have a four-dot pattern in them? (7) How many numbers include a three dot patterns? (all odd numbers)

### Number-Recognition Activities

*Use the laminated dot cards for games, which children can play independently in the math center.*

**War:** Students play in pairs. Players display a card simultaneously, facing up on the table. In the traditional game, the player who displays the higher number gets both cards. The child has to correctly name both quantities laid down in order to take the cards (without counting dots!). For variations, have the lower quantity win, or odd over even, and so on.

**Memory:** A small group can play memory using two sets of cards. Again, the children should name the quantities they turn over without counting the dots.

**Go fish:** Using four sets of cards for a small group, have children play Go Fish. Each player has to ask for the desired card by number name, not by showing the card to the group.



**Name that number:** Students work together in pairs, using the dot cards. One child holds up a card and the other names it as quickly as possible. Have students trade off roles of holding up and naming cards.

## RELATIONSHIPS BETWEEN NUMBERS

For number relationships, begin with the 5-frame number chart (see 2.2 on page 69). You can photocopy enough copies for each child to have one, or project one copy on an overhead projector. You may wish to laminate for durability.

Begin by displaying that filled-in 5-frame chart for group discovery time (See below). Ask the children to talk about the patterns they see. Where and how do numbers repeat? Find numeral patterns such as 1, 6, 1, 6, 1 and 2, 7, 2, 7, 2 and 3, 8, 3, 8, 3, and so forth. Examine the fives column and notice how the numbers in the 10s position repeat (**1**0, **1**5, **2**0, **2**5, **3**0, **3**5, **4**0, **4**5, etc.). What is significant about this pattern?

### Number-Recognition Activities

**Full frame:** Give each child a blank 5-frame chart to 20 (2.3, page 70). Call out numbers at random, asking students to write each number in the box where it belongs. This activity is self-assessing, because when you are finished, the children can check their own work to see if their numbers appear in the correct sequence.

**5-frame patterns:** Again using the blank 5-frame chart (2.3, page 70), call out questions that require children to recognize the patterns within the chart. For example, "Write the number under eight" or "Write the number above six." This activity will help cement in students' minds the relationships between the numbers in each column of the chart.

*Children who are highly visual will recognize additional patterns as they continue to use this chart. For example, they might note that adding five to any number yields the number directly underneath it on the chart. If they add ten, they will skip down two rows. If they add four, they will skip down one row then move one space to the left. To add six, they move down one row then move one space to the right.*

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 |
| 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 |
| 21 | 22 | 23 | 24 | 25 |
| 26 | 27 | 28 | 29 | 30 |
| 31 | 32 | 33 | 34 | 35 |
| 36 | 37 | 38 | 39 | 40 |
| 41 | 42 | 43 | 44 | 45 |
| 46 | 47 | 48 | 49 | 50 |
| 51 | 52 | 53 | 54 | 55 |
| 56 | 57 | 58 | 59 | 60 |
| 61 | 62 | 63 | 64 | 65 |
| 66 | 67 | 68 | 69 | 70 |

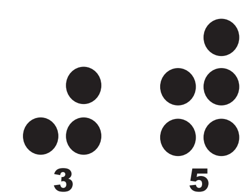
**How high can you go?:** Make numerous copies of the long blank 5-frame chart (2.4, page 71) and cut apart along the dotted line. Give each child several charts to tape together end-to-end to form a really long chart. (Each child can choose how long to make his or her chart.) Then, the children write in all the numbers to fill their charts. The self-assessment piece consists of checking that patterns are correct.

**5-Frame Dot Cards:**

Use the 5-frame dot cards (activities 2.5a-b, pages 72-73) to help children visualize where each number falls in relationship to the base of ten. The number at the end of each full row (here, 5, 10, 15, 20) becomes an "anchor number" to which numbers are added or subtracted to yield quantities in partial rows. This visual imprinting allows children to see computation globally, a particular benefit to those who are not logical-sequential thinkers. You can also use the cards to practice oral computation. Have the student begin by naming the quantity shown (e.g., 12). Then ask questions such as, "How many more dots would you need to make 15?" "How many would you have if I gave you only two more?" "What about if I took away four?" Students can also play the card games listed on pages 16-17, such as Go Fish or Memory.

## VISUAL IMPRINTING FOR COMPUTATION

Visual imprinting refers to the practice of purposeful transfer of an image to the brain by asking the child to close his eyes and see the image in his imagination. Give each student a copy of activity 2.1, the dot cards, and some colored pencils. Using the dot card transparencies you made for the "Meaning of Numbers" activities, place one card at a time on the overhead. Guide students to first of all "see" the dot pattern in their imaginations, and then take it further by recognizing subgroups within each dot pattern. Let's use these dot cards as an example to illustrate the process:




**For the three-dot pattern:** Ask students to first of all "see" the dot pattern in their minds. Then, find 2 + 1 in this dot pattern. Have them circle the two dots and one dot separately using their colored pencils.

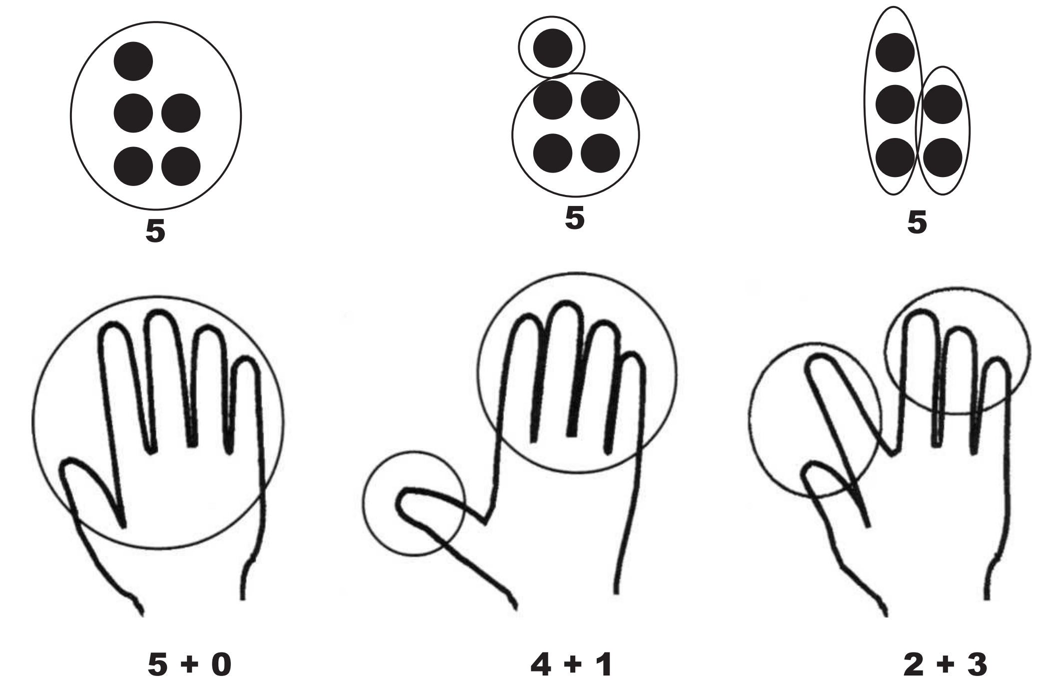
**For the five-dot pattern:** Ask whether students can find a 4 + 1 pattern in this dot grouping. Have them circle the four dots and one dot separately. Now have them look for a 2 + 3 grouping. Using a different color, have them circle the two dots and three dots separately.

Continue in this manner with each set of dots until students have circled all the possible number combinations that add up to each number from two to ten. I have also provided sheets of hollow dots (see 2.6a-b, pages 74-75). If you would prefer, you can have children color in the subsets of dots with their colored pencils, rather than circling them. These pages can be stapled together to make a number book for each child.

### My Two Hands

Now show each dot card again. As you identify the subgroupings this time, have the children show you the computation on their hands. The "My Two Hands" strategy is explained in detail in Chapter 6 of Book 1. In brief, it is a kinesthetic and visual method of showing computations by spreading the fingers apart or moving them together. Two is represented with the index and middle fingers, four with all four fingers, five with the fingers and thumb, six with the fingers and thumb of one hand plus the thumb of the other, and so on. To add






any pair of numbers totaling up to ten, students can represent each number on their fingers and simultaneously see the sum. The above illustration shows the sums for five.

### Number Houses to Ten

Using activities 2.7a-2.9f (pages 76-90), follow the steps below to ensure children have mastered computations to ten. For any child who struggles with the number-house activities, back up and provide plenty of practice with the earlier activities before reintroducing number houses.

1. Refer to Chapter 7 of Book 1, if necessary, to explain the rules for filling in the houses.
2. Give each student a set of concrete objects, such as plastic counters. Have the students count out three counters, then figure out how many ways they can group them (3 + 0 and 1 + 2).
3. When students have discovered the possible groupings for 3, give them the "Figure out which families can live in each house" activity for 3s (2.7a, page 76) and have them write in the number combinations they discovered with their chips.
4. Next present the trifold activity of blank houses for Third Street (2.8a, page 80, which has two houses in each row). Have them fold under the bottom two sections, then fill in the top two houses with the correct numbers. (Each attic will have the numeral 3 in it, and the two floors will show the combinations that make up three, namely the numerals 0 and 3 in the first house and 1 and 2 in the second.) When finished, have them fold that section down and show the second row of houses. Have them complete that row in the same way, then turn to the last row of houses (thus practicing the same sums three times).
5. Repeat steps 2 through 4 for the number four (2.7b, page 76) for "Figure out which families can live in each house" and 2.8b, page 81 for practice houses).
6. Next, give students the page of mixed addition and subtraction problems for 3s and 4s to complete (see 2.9a, page 85).

7. Repeat steps 2-6 for the numbers five and six. There is also a worksheet that mixes problems for sums from 3 to 6 (2.9c, page 87). Then repeat the process for the numbers 7 and 8. Finally, repeat the process for the numbers 9 and 10. Note that activity 2.9f has a mix of problems for sums from 7 to 10.

When the class can do all these problems fluently, move on to Chapter 3!

## ASSESSMENTS

For your convenience, an individual assessment report and two whole-class record charts are provided in Appendix B beginning on page 206. They are designed for recording students' mastery of the concepts reviewed in this chapter. You can use the following assessment procedures to check for mastery of each concept. Remember that any student who has not mastered all these math skills fluently will falter as new material is introduced throughout the rest of the book. So if any students struggle, provide small-group teaching until they demonstrate readiness to move on.

**Dot patterns:** Mix up the set of dot card transparencies. Write down the order of the transparencies so you have an answer key to check students' papers. One at a time, show each transparency briefly. Have the children write the numeral represented by that dot pattern on their paper.

**Blank 5-frame to 20:** Give each student a blank 5-frame chart to 20. Call out each number from 1 to 20 in a random order (record the order for yourself) . Have students write each number you call out in its correct location in the 5-frame.

**Dot flash cards:** Using the 5-frame dot cards, mix them up in a random order. (Record the order for your answer key.) Flash each card briefly and have the students write down the numeral corresponding to that dot set on their papers.

**Colored dot subsets:** Using the pages of hollow dots, color each set of dots in two different colors to represent a pair of numbers that totals that sum (for example, five dots = 3 + 2). Hold up one of these sets of dots. Have the students represent the sum on their hands using the "My Two Hands" strategy. Do a quick visual check.

**Mixed number-house problems:** Give each student a sheet (or sheets) of mixed addition and subtraction problems for all the numbers to ten.



# 3 PLACE VALUE

**GOALS FOR THIS CHAPTER**

1. To act out the concept of place value
2. To apply the concept of place value to real-life situations
3. To demonstrate understanding of place value using concrete materials


Although place value traditionally is not introduced until middle elementary grades, I teach place value early as a key element of computation with multi-digit numbers. Using the visual/kinesthetic approach of Right-Brained Computation, students will first see what place value means in concrete terms, to enable them to utilize this concept as they work through the lessons in this book. Because place value is demonstrated in concrete terms using attic numerals 1 and 10, children can embrace the concept as early as kindergarten.

## CONCRETE PRACTICE WITH PLACE VALUE

Just as simple sums were introduced using a story to place them in a real-world context, I extend the Stony Brook story to introduce the concept of place value.