

Right-Brained Addition & Subtraction



a Forget Memorization book

Effortless learning through images, stories, hands-on activities, and patterns

by Sarah Major



www.child1st.com

Right-Brained Addition & Subtraction

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Other books and materials by this author:

Alphabet Tales
The Illustrated Book of Sounds & Their Spelling Patterns
The Easy-for-Me™ Books, sets A and B
The Easy-for-Me™ Reading Program
Kid-Friendly Math Series
Right-Brained Multiplication & Division
Writing the Visual, Kinesthetic and Auditory Alphabet
SnapWords® sight word cards and SnapLetters™ stylized alphabet
I Can Sing from 1 to 10
SnapWords® Spelling Dictionary

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 learning pieces using a variety of right-brain-friendly elements. We take learning tidbits 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.

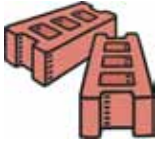












RIGHT-BRAINED ELEMENTS:

- 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, “8 is a snowman, makes me laugh,” establishes that the symbol for 8 is really a snowman friend, and because their shapes are so similar, the child can easily use the image of the snowman to learn and remember 8.
- 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 the meaning of what we are teaching in math. 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 learning piece 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

You may approach this book in several ways, depending upon your particular needs, the level and ages of the children you are teaching, and your time constraints. If you have the time, reading the entire book is best. It is not difficult reading! Although the method of visual computing is not presented until part II (chapter 4), the chapters in part I contain essential background information. The chart on the following page shows the contents of the book globally, and Chapter 1 (p. 12) contains suggestions for use with children at a beginning or intermediate level, or for older children needing remedial assistance.

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	
<p>Concrete I use my senses to take in data about the world. What I see is what is real to me.</p> 	<p>Abstract I visualize, intuit, imagine, read between the lines, and make connections. I pick up subtle clues.</p> 
I order the information I perceive	
<p>Sequential I organize my thoughts in a linear, step-by-step manner. I prefer to follow a plan.</p> 	<p>Random 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.</p> 
How do I remember? (Raymond Swassing & Walter Barbe)	
<p>Auditory I listen to directions. I need to hear the sounds.</p> 	<p>Visual I need to see it. I make visual associations, mental maps or pictures, and see patterns.</p>  <p>Kinesthetic I remember well what I learn through my body. I learn best by actually doing the job.</p> 
How do I understand? (Herman Witkin)	
<p>Analytic I am good with details, can follow steps and hear instructions, and like to finish one thing at a time.</p> 	<p>Global 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.</p> 
How am I smart? (Howard Gardner)	
<p>Verbal/Linguistic I am verbal! I can speak, write, debate, and express myself well through words. IQ tests love me!</p>  <p>Logical/Mathematical I rely heavily on my logic and reasoning to work through problems. I am a whiz on standardized tests.</p> 	<p>Visual/Spatial 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.</p>  <p>Body/Kinesthetic I combine thinking with movement. I do well with activities that require precise motions. I learn by doing; my attention follows my movements.</p> 



3rd Street



5th Street



7th Street



9th Street



4th Street



6th Street



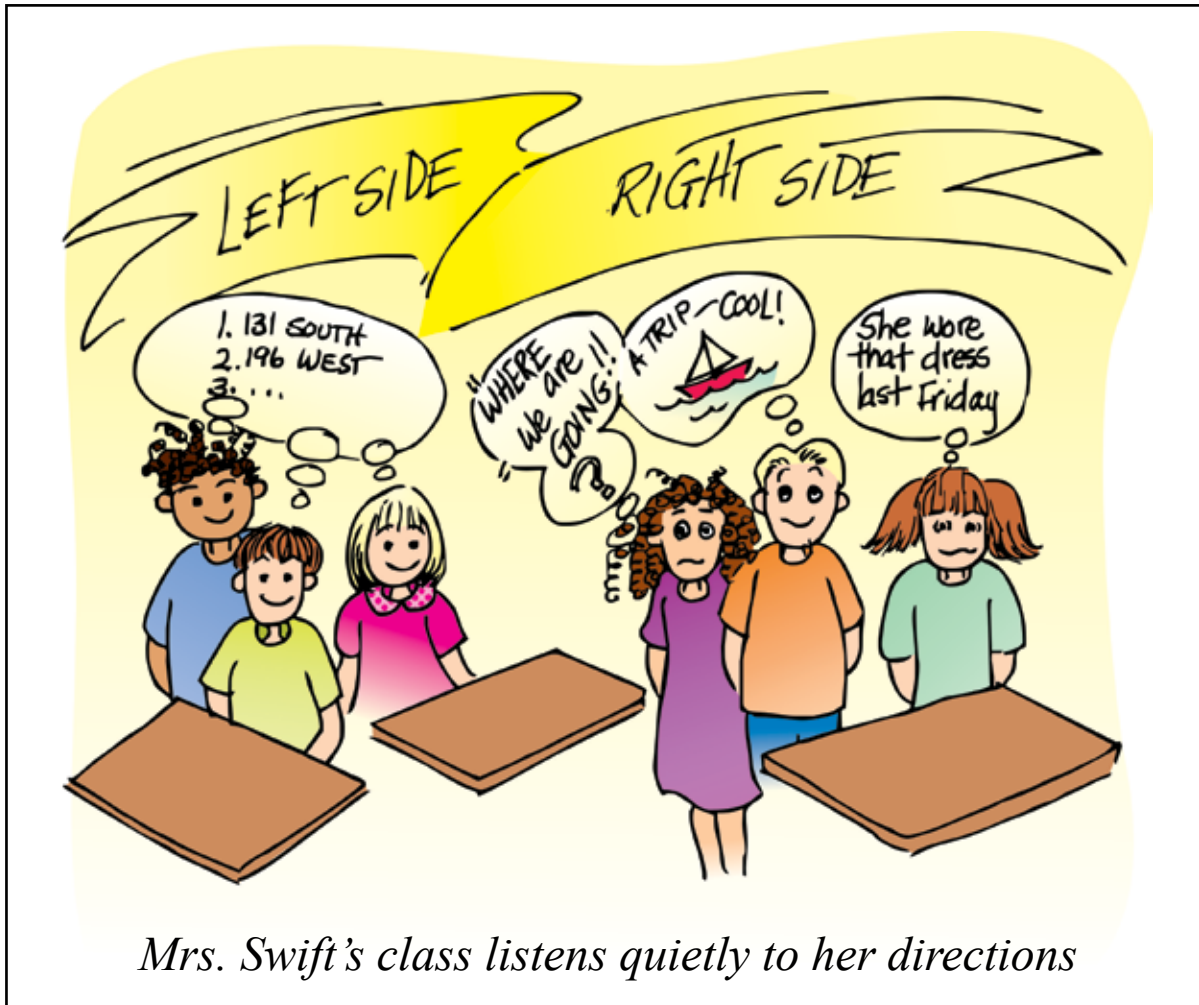
8th Street



10th Street

STONY BROOK

1 CONSIDER THE CHILD FIRST



As I look back over the process of my learning how children learn, because I think in pictures, I see children's faces and I think, "I learned that strategy from Zachariah, this from Alice and Ben, this from Nathan, that from Debbie," and the list goes on. I began to learn to teach children when the children became my focus instead of the material I was teaching. As I taught, I learned from the children how uniquely they view the world and process new information. The more I learned about them, the more certain elements of practice surfaced that seemed to work nearly universally, elements not always found in traditional classes.

CONSIDERING LEARNING STYLES WHEN TEACHING MATH

To understand the value of the right-brained method of computation, it is important 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 those learning needs that must be addressed in order for one math method to be successful for all children, regardless of their learning needs.

We will do an overview of 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 a single simple plan for good teaching practice.

The chart on page 6 presents an overview of the learning styles that I consider 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 and 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. Often there is no real-life application within the problems, and most frequently, students work solely with paper and pencil, having no opportunity to construct meaning for themselves using real objects.

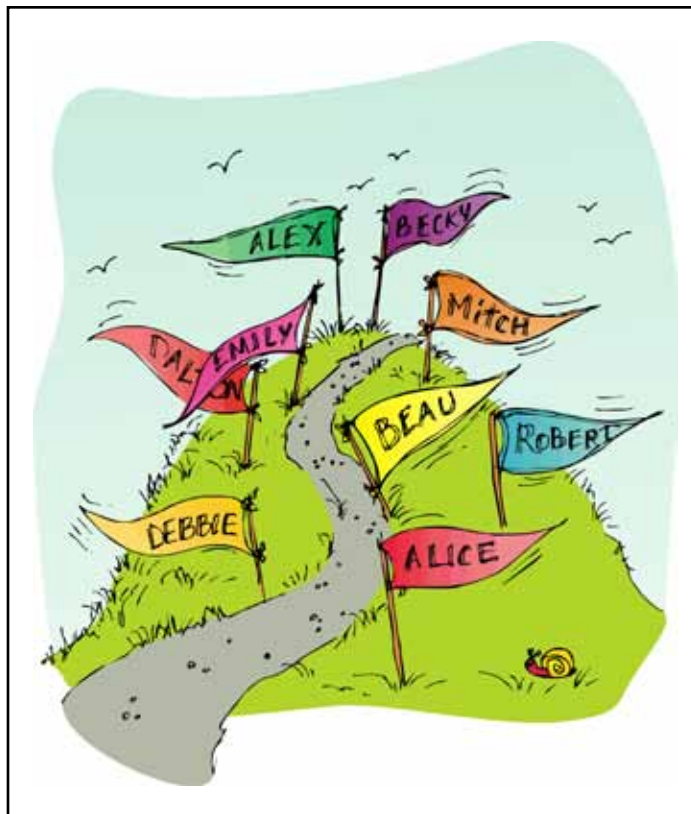
It is possible to teach math, as concrete and sequential as it is, in a way that will reach abstract, random, visual/spatial, kinesthetic, and global students instead of continuing to try to move them over to strictly left-brained approaches. Let’s make the assumption, then, beginning today, that we will change our method of teaching math to reach 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 have come to believe that children who are highly visual also tend to be global, somewhat random, and kinesthetic. Think about it. Visual children see a whole picture, identify smaller elements within that picture, and notice how they connect to other elements within the picture. They 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 physical 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. They might not understand the process the way another student sees it, but if they are certain of the goal of the lesson, they will likely invent good steps that make sense to them and allow them to reach the goal.

Learning Disabilities?

I prefer to avoid labeling children in any way. Ever since my experience with Lisa and the fishbowl, I’ve been trying to learn as much as I can about learning disabilities. What are they really? Poor eyesight



Principle 8. Provide Visual Connections

Guideline: Find a means of visually connecting every new concept to something the student already knows.

Rationale

Many scholars argue that most of what we remember enters the brain through the visual modality (Jensen 1994). When we make visual connections, either we are automatically reminded of something else, which is then linked in our memory with the new idea, or we make a conscious effort to form a connection that will serve as a memory prompt.

For visual learners, this avenue is essential. When visual learners hear verbal instructions, what they hear and what they are able to process are frequently two different things. They need to see what they are hearing.

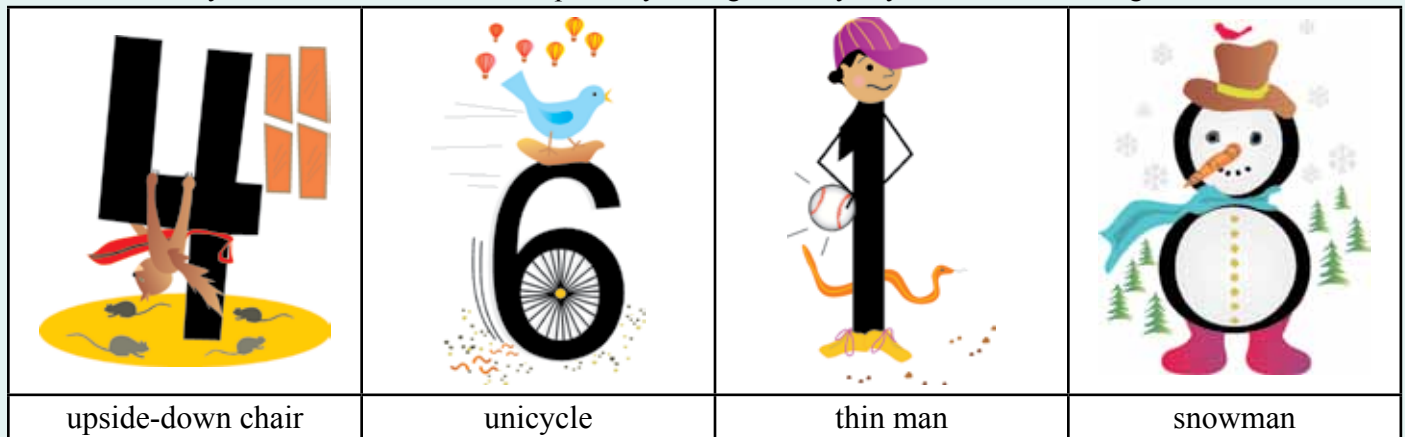
Applications

Here are some suggestions for making connections as you teach:

- Ask students these questions constantly during your teaching: “What does this look like?” and “What does this remind you of?” Record students’ answers.
- Discuss the various suggestions with the students and collectively agree on a specific visual cue for each concept. These cues become triggers that help students retrieve abstract facts from memory. Once the fact has been learned, children will automatically lose the need for the visual connection and recall will be automatic.

CASE STUDY

When my preschool students were having trouble remembering which number symbol corresponded to each number name, we discussed what each number looked like. The group chose known objects, the shapes of which reminded them of each number symbol. I watched and waited patiently during the early days of number learning, when the children



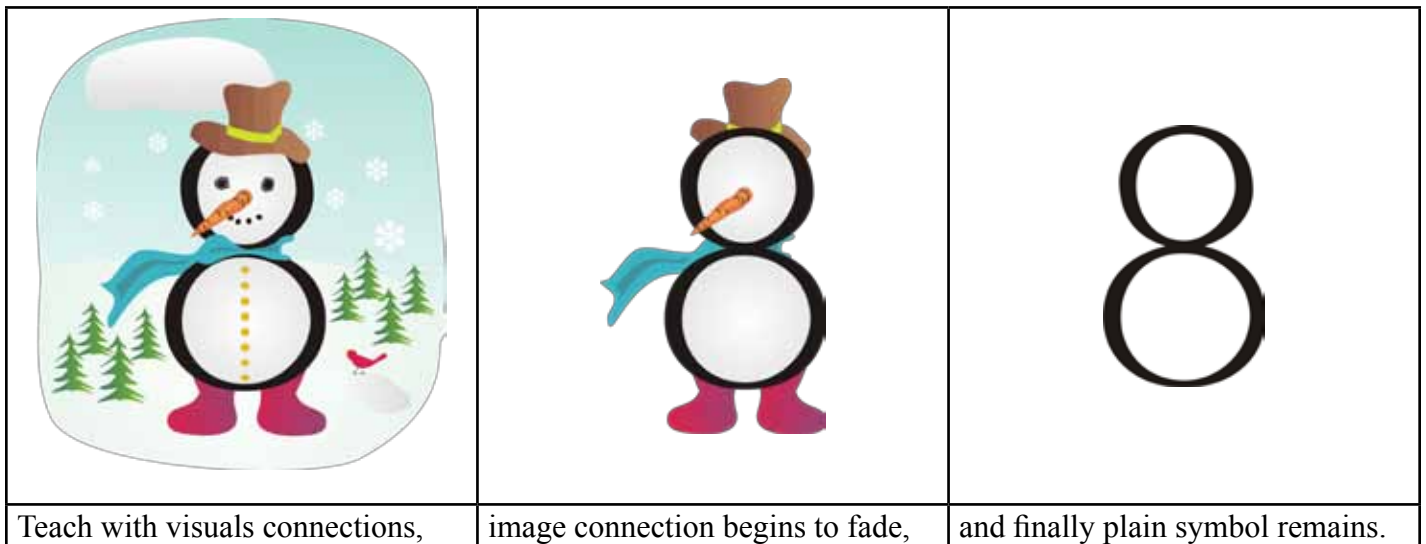
used the number names and associated picture names interchangeably. Finally, the day came when they dropped the picture name and retained the number name. With the extra visual step of associating a picture, learning occurred more rapidly and without stress for the children. The children were easily engaged in learning their numbers. These stylized numbers will be presented in chapter 4.

Principle 9. Set the Stage for Visual Imprinting

Guideline: *Teach your students to study a global body of material, then close their eyes and see it in their minds rather than memorizing the facts in the body of material.*

Rationale

Visual imprinting refers to a practice that is difficult to define. Imprinting just happens; it is a subconscious form of learning (what I call “learning through the back door”). Visual imprinting has occurred any time we can “see” a complete picture or a specific part of it in our mind’s eye. Even though visual imprinting is elusive, we can deliberately take advantage of it in our teaching. In fact, it has become one of the most powerful tools I use in teaching. It is primarily through this means that my children learn their sight words, the meaning behind the number symbols, and their math facts to ten. Each time I ask, “How did you remember that?” and the student answers, “I saw the snowman” (see illustration below) or some other response that reveals visual imprinting, I feel the magic of visual learning all over again.



Applications

To promote visual imprinting in your teaching, try these strategies:

- Use stylized materials as often as possible. For example, in helping a child remember 20, 30, 40, and so on, you could quickly make the 0 in each number into a teacup. Then, point to the first digit as you say the first part of the number name, and as you point to the 0/teacup in each number, say “tea.” Let the pictures enter the mind of the child passively; do not try and actively teach the association. Remember, the child is acquiring a mental photo of the concept. This is an automatic process, not one that can be forced.
- Use such stylized materials only about three times during learning before stopping to check for recall using normal printed numbers. Isolate the facts the child still does not recall and use stylized materials with those facts a few more times.

The NUMBER SONG

Words and Music: Sarah Major

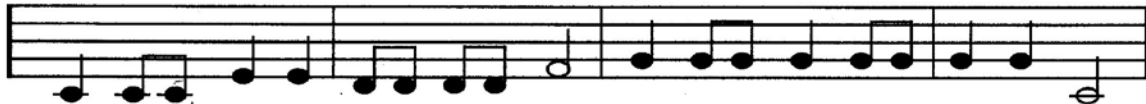


Words One is a thin man stand-ing up straight, Two is a fish-ing hook rea-dy for bait.

Motions (Stand up straight with arms to your sides)

(Trace the shape of a 2 with outstretched arm)

Left Hand E G B G G E E F G B

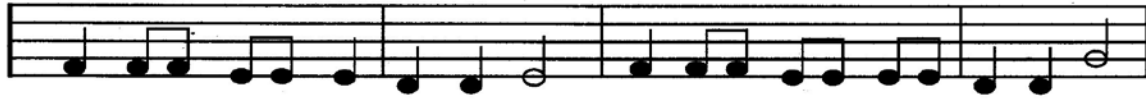


Three is a ca - mel sit-ting on the ground, Four is a chair that is turned a - round.

(Trace a 3 - the sitting camel's back - in the air)

(Turn head as though looking up-side-down)

E G B G E F G C



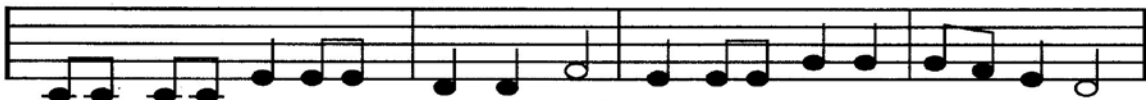
Five has a tum-my too big to hide!

(Hold arms out in front as though circling a large tummy)

Six is a un - i - cy - cle; watch me ride!

(Mimic riding a unicycle, maybe teetering a bit)

A G F B C A G F A B



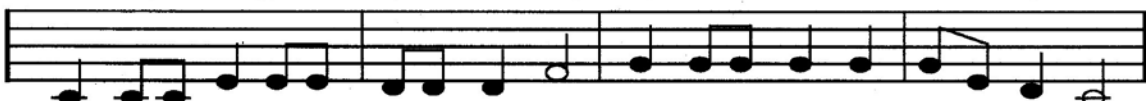
Se-ven is a stick that is snapped in half,

(Snap an imaginary stick with your hands or over your knee)

Eight is a snow-man ma-kes me laugh!

(Clutch tummy as though laughing or trace the shape of an 8)

E G B G G E E F G B



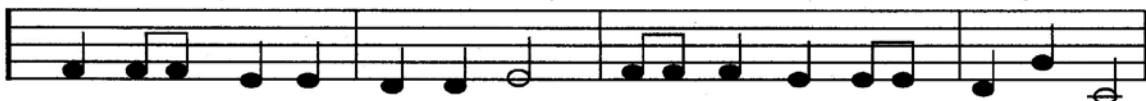
Nine is a red bal-loon float-ing up high,

(Float an imaginary balloon upwards)

if I let go I thi-nk I'll cry!

(Rub eye with fist as though crying)

E G B G E C G E



Ten is a thin man, hear him say, "Bet-ter watch out or you'll roll a - way!

(Be the straight thin man, then

turn to side and shake finger at the round person by you)

A G F B C A G F B E

5

UNDERSTAND the MEANING of NUMBERS

Goals for This Chapter

1. To visually imprint number meanings
2. To make visual connections for numbers to ten
3. To visually imprint computations to ten
4. To form visual imprints of where numbers are in relationship to one another
5. To recognize numbers within their context
6. To discover relationships between numbers

The magic ingredient in visual computing is the brain's ability to recall visual images. If you gain nothing else from chapters 1 to 3, the concept of visual imprinting is a must. In order for this method of computing to work, visual imprinting must take place—and it will, if you allow time to do some things that might appear at first glance to be just playing. The more care you take at the stage of the process described in this chapter, the more success your students will reap in future computation.

This chapter contains various activities to promote visual imprinting, visual connections, and pattern discovery. The results of this process will not be measurable using the objective assessments we have become accustomed to using. I will, however, detail how to tell when your goals for this stage have been reached. The process itself is so much fun that it may be tempting to rush through the activities, but please do not give in to this temptation! If you allow sufficient time to complete the visual imprinting exercises in this chapter, you and your students will see the payoff once you arrive at actual computation (described in chapter 7).

VISUAL IMPRINTING FOR NUMBERS TO TEN

The objective for this section is for every child to emerge with a clear visual image for each number. You will not, of course, be able to dictate what that image will be—all that matters is that each child emerges with an image that is unique to his or her memory. The visual image will probably involve a dot pattern and may include some color. You will have a chance to see some of these images as the children produce them for you in their final projects.

Initiating The Number Imprinting Process

Materials Needed

- overhead projector
- poker chips or similar tokens

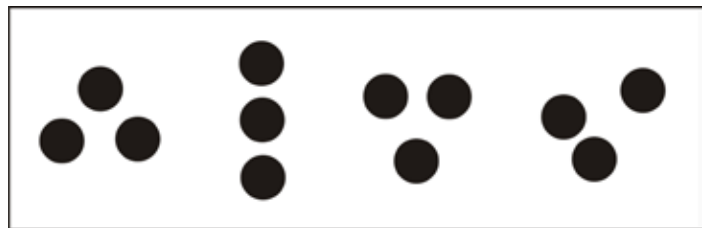
* *If working with only a couple of children, use poker chips or math counters on a desk top.*

1. Choose a target number. Set up the overhead projector and place that number of poker chips on it so the whole class can see them. *

2. Ask the children “How many are there?” Do not allow them to count; instead, ask them to guess! (We want this to be an instinctive, visual imprinting process, not a left-brained one.)

3. Quickly rearrange the chips and ask again, “How many are there now?” Repeat this step several times. You want the children to understand that no matter what the arrangement, the total number stays the same.

4. Ask questions to demonstrate that changing the location or arrangement of the chips does not change the quantity. For example, “If I put these on the floor, how many are there then?” or “If they are on the ceiling, how many are there?” “If I hold them tightly in my hand, how many are there?” Students will remember the point.



5. Place one dot grouping for the target number on the overhead projector. Ask, “What does this look like to you?” (Visual connections are being made.) Let volunteers give answers. Then show another grouping and ask the question again. Feel free to tell students what that dot pattern reminds you of. Here are some ideas to get your creative juices flowing:

<i>bear's face</i>	<i>box</i>	<i>footprint</i>	<i>house</i>	<i>baby's chair</i>	<i>hill</i>
<i>building</i>	<i>mother's chair</i>	<i>truck</i>	<i>bushes</i>	<i>papa's chair</i>	<i>mountain</i>

PROCEDURE for TEACHING NUMBER HOUSES

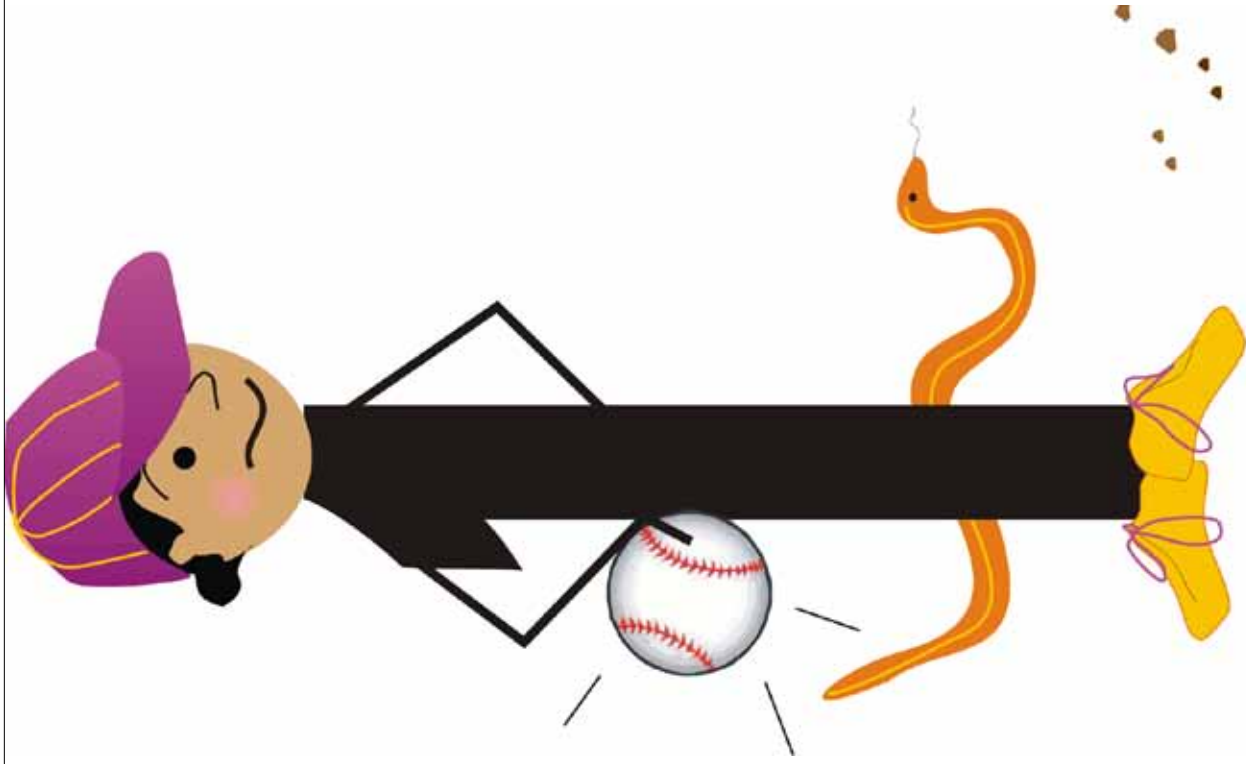
Work through all the following steps for one street at a time before presenting the next street, starting with Third Street. Worksheets 7.4 to 7.10 refer to series of worksheets (distinguished with the letters a, b, c, and so on). In each cycle through these steps, present only the version of the worksheet that is appropriate for the number family you are targeting. Procedures are spelled out starting on page 70.

Discovery

- 1. Felt houses and bears:** The children arrange small toys, such as plastic bears, in felt number houses, in order to discover with concrete objects the combinations that total the attic number (7.1 and 7.2a-b, pp. 125-129).
- 2. Smallest to largest:** The children place number cards in the windows of the number houses, thereby discovering the pattern that, on each street, the smallest number goes with the largest one, the next smallest with the next largest, and so on (7.1-7.3).

Exploration

- 3. Discovery worksheet:** Activity 7.4, pp. 130-133, mirrors the discovery process in step 2, but now the children write the appropriate numbers in the house windows.
- 4. Practice houses worksheet:** Activity 7.5 has students repeatedly write the pairs of numbers for each street in order to gain automaticity.
- 5. All and no more:** Students examine 7.5 to determine that there are no other possible combinations that total the target number.
- 6. My two hands:** Children make the number combinations for the street on their hands in order to build a brain/body/visual connection to the number pairs for that street.
- 7. Practice strips:** Activity 7.5 is presented again, this time with houses partially completed in a random order, rather than the strict numerical order of the Stony Brook street.
- 8. Families went walking:** Activity 7.6, pp. 139-142, introduces subtraction from the target number.
- 9. Additional practice:** If any students have not completely mastered the tasks presented so far, provide additional practice.
- 10. Relate houses to addition and subtraction problems:** Activity 7.8, pp. 147-152, takes one street at a time, displays the possible problems for that street, and has the student refer to the houses to answer each problem.
- 11. Mixed addition and subtraction practice:** Activity 7.7, pp. 143-146, contains mixed addition and subtraction problems for the target street.
- 12. Writing problems:** Activity 7.9, pp. 153-158, is an optional but recommended worksheet that has children translate each house on the target street into the traditional addition and subtraction problems that correspond to it.
- 13. Mixed numbers practice:** Once students have mastered at least Third and Fourth Streets, you can present worksheet 7.10, pp. 159-164, which mixes problems for the target street with problems for the previously mastered streets.
- 14. Additional practice:** Activity 7.11, p. 165, is a page of blank number houses you can use to make up problems for any student who needs some extra practice before moving on. Activities 7.12a-e, pp. 166-170, provide for extra practice as well.



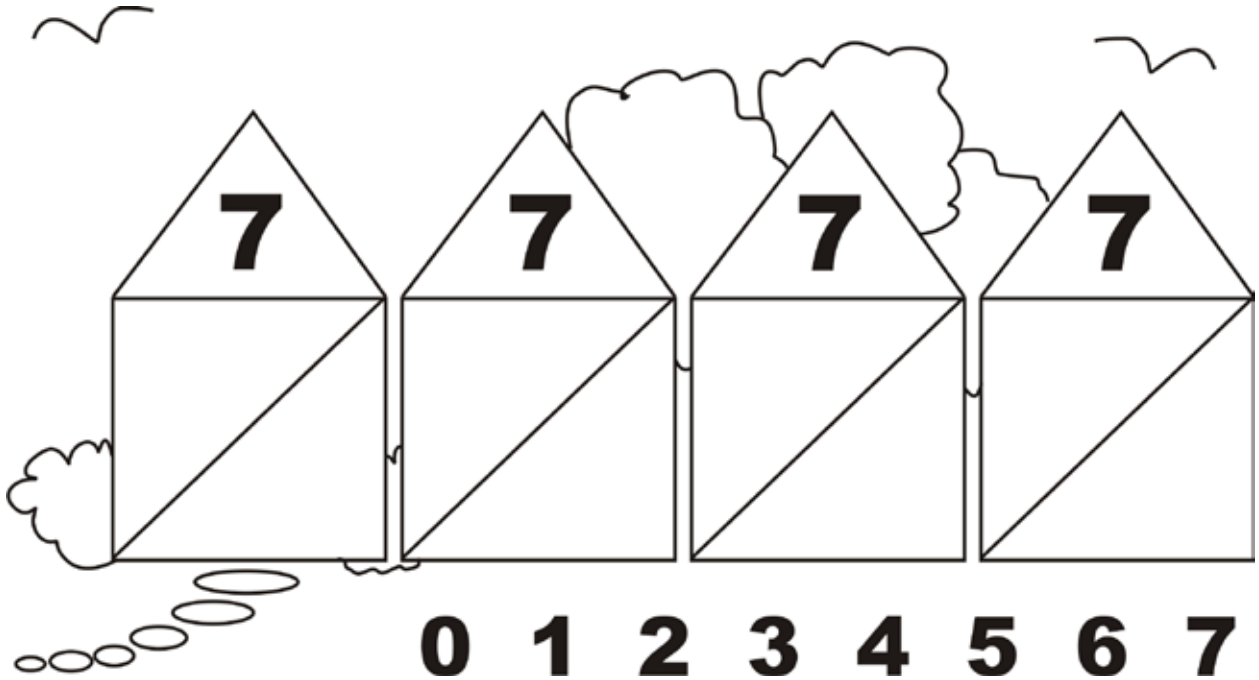
1 is a thin man
standing up straight,



2 is a fishing hook
ready for bait.

7.4e. Sevens

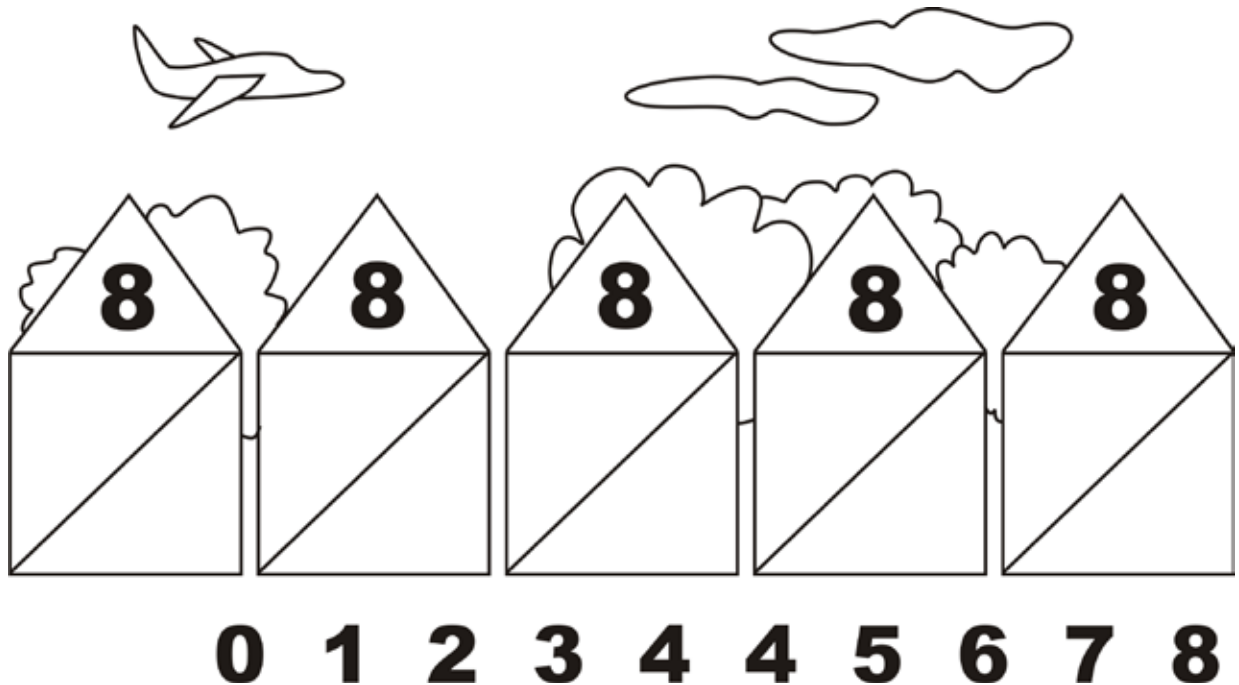
Figure out which families can live in each house.



Name: _____

7.4f. Eights

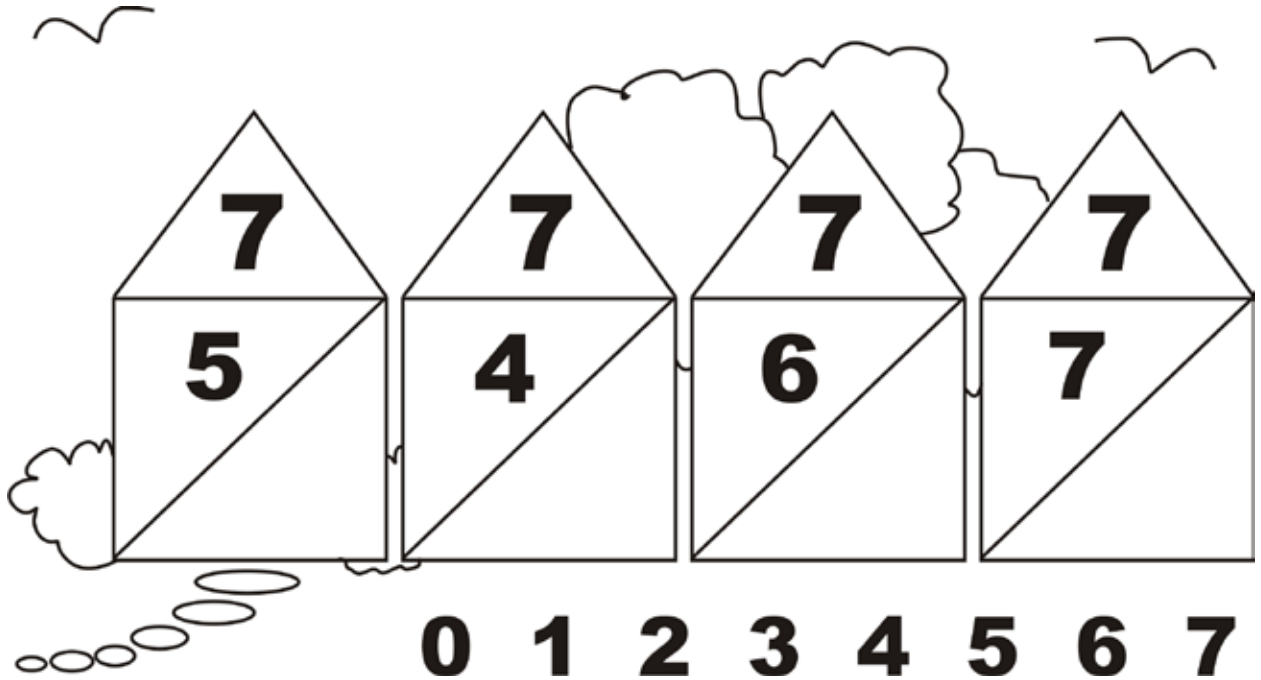
Figure out which families can live in each house.



Name: _____

7.6e. Subtraction problems for seven

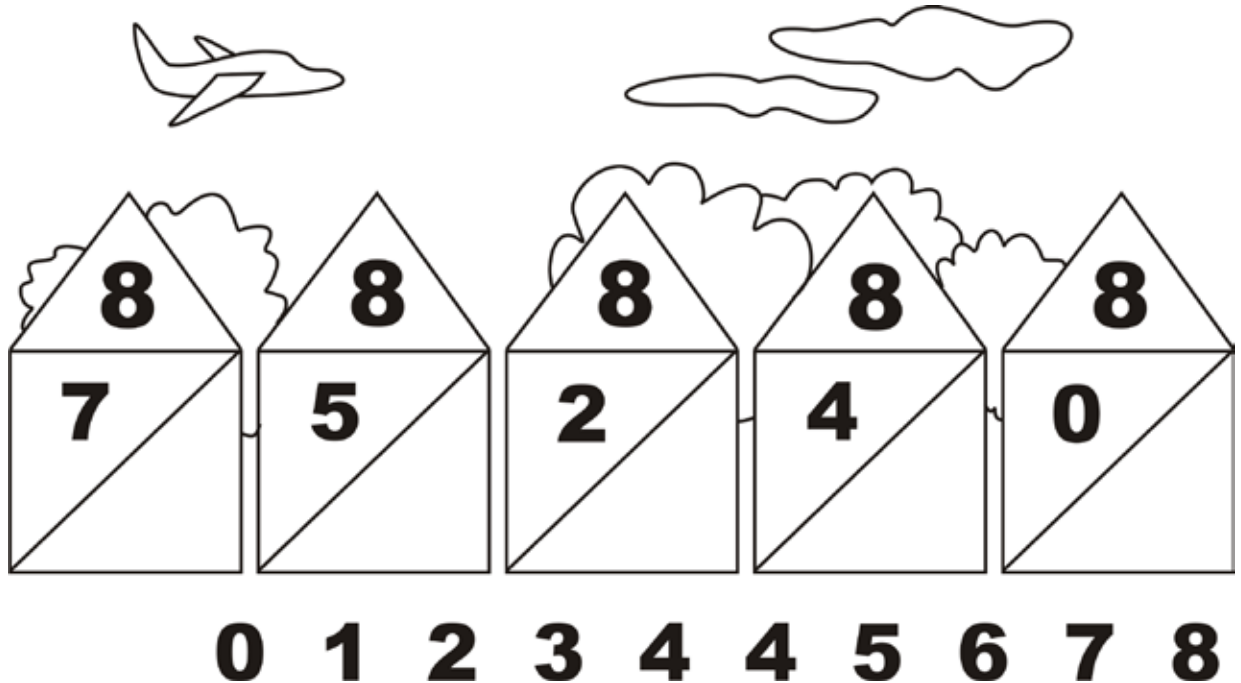
Please help me figure out which families went walking.



Name: _____

7.6f. Subtraction problems for eight

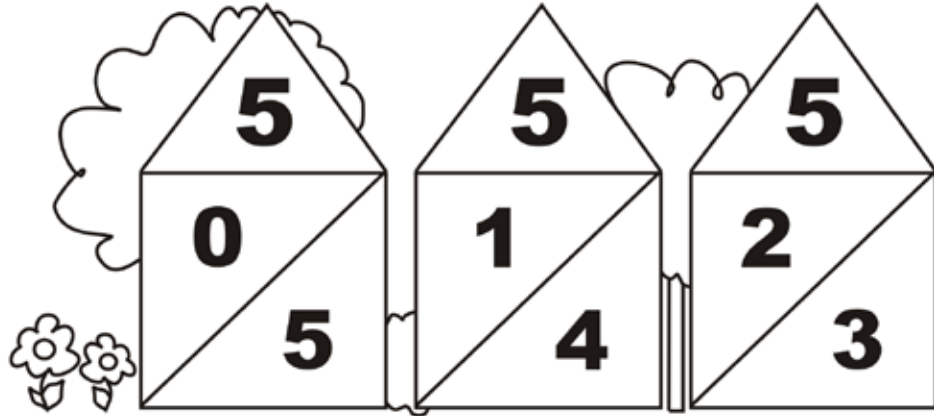
Please help me figure out which families went walking.



Name: _____

7.8c. From houses to number problems - fives

Name: _____

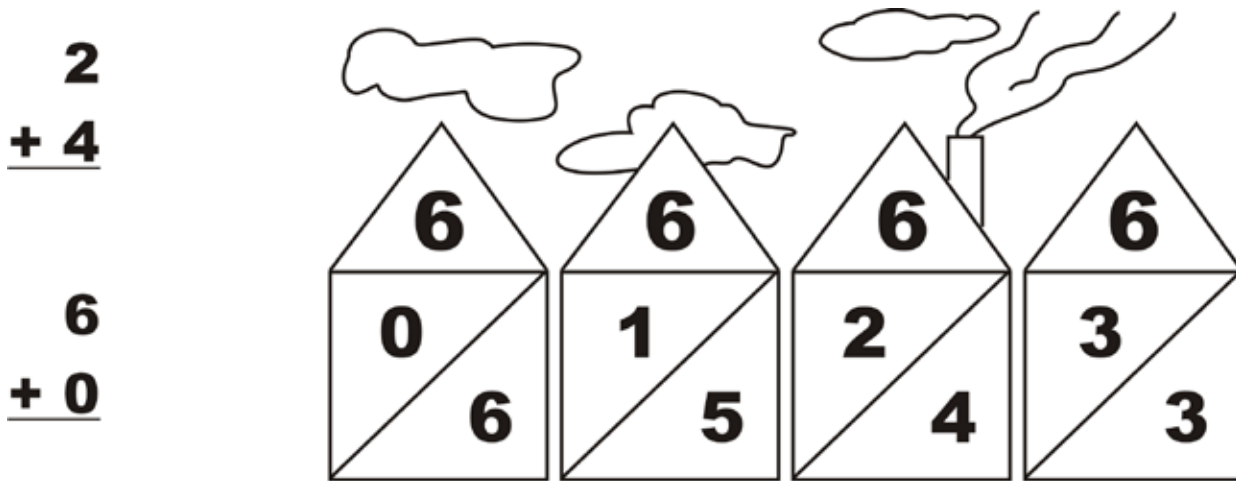


2	5	1	5	5	5	5	5
+ 3	+ 0	+ 4	- 4	- 2	- 5	- 1	- 3

Use the houses above to solve each problem.

7.8d. From houses to number problems - sixes

Name: _____



$$\begin{array}{r} 2 \\ + 4 \\ \hline \end{array}$$

$$\begin{array}{r} 6 \\ + 0 \\ \hline \end{array}$$

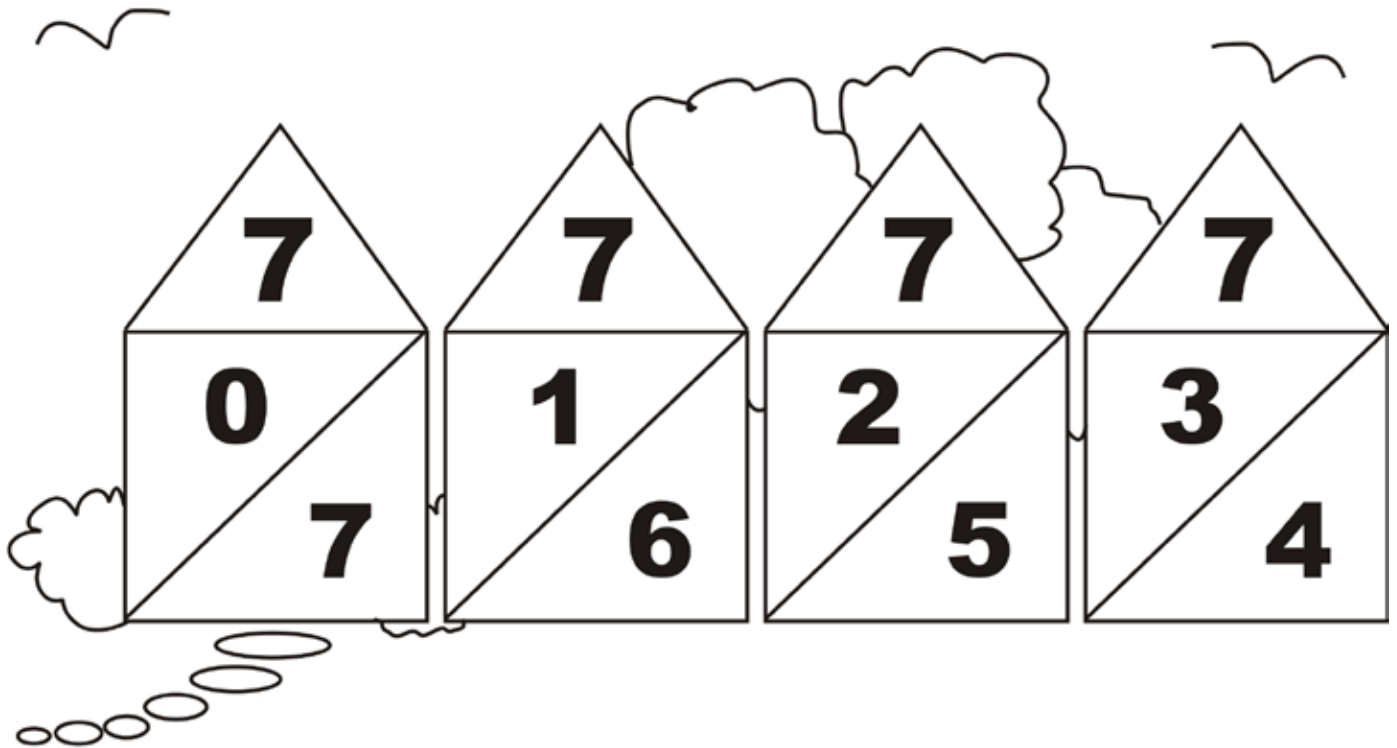
3	6	6	0	6	6	6	5
+ 3	- 2	- 4	+ 6	- 1	- 3	- 5	+ 1

Use the houses above to solve each problem.

7.8e. From houses to number problems - sevens Name: _____

Use the houses below to solve each problem.

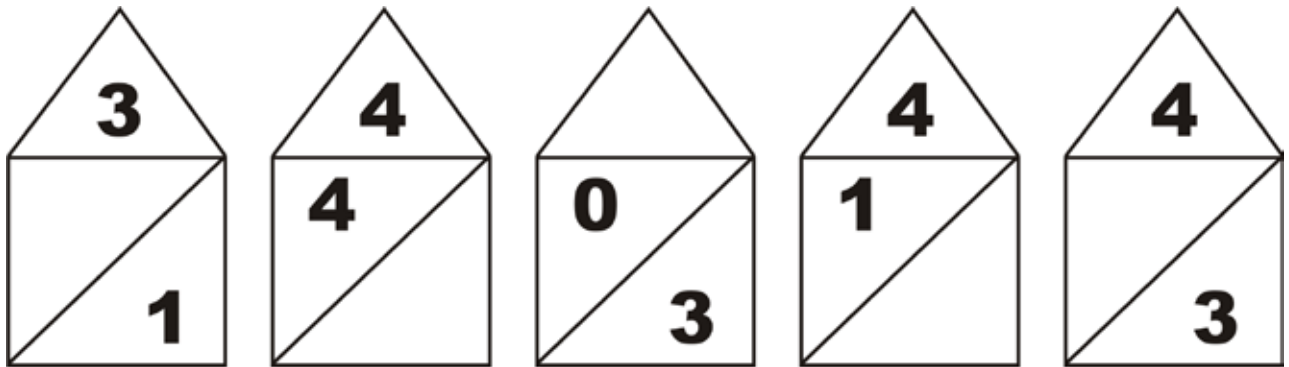
$$\begin{array}{r} 7 \\ - 3 \\ \hline \end{array} \quad \begin{array}{r} 3 \\ + 4 \\ \hline \end{array} \quad \begin{array}{r} 0 \\ + 7 \\ \hline \end{array} \quad \begin{array}{r} 7 \\ - 2 \\ \hline \end{array} \quad \begin{array}{r} 2 \\ + 5 \\ \hline \end{array} \quad \begin{array}{r} 6 \\ + 1 \\ \hline \end{array} \quad \begin{array}{r} 7 \\ - 5 \\ \hline \end{array} \quad \begin{array}{r} 5 \\ + 2 \\ \hline \end{array}$$



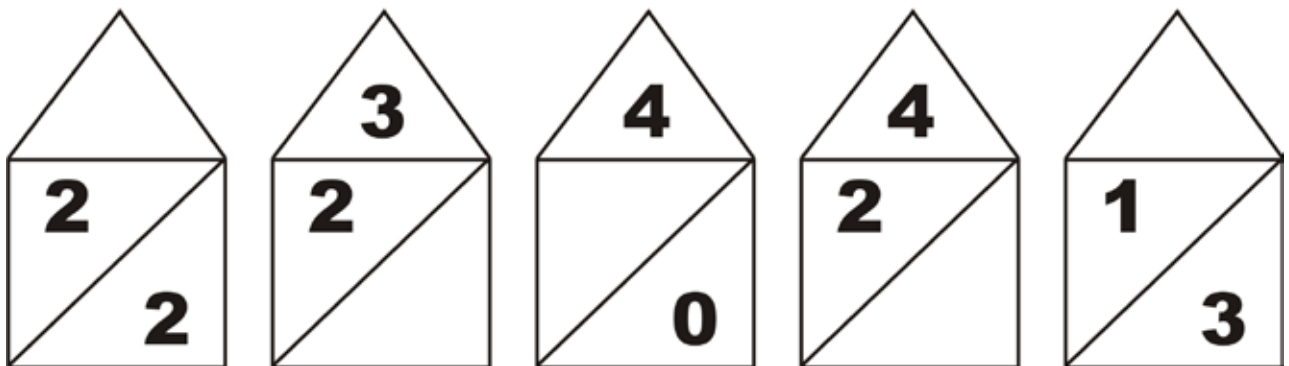
$$\begin{array}{r} 7 \\ - 0 \\ \hline \end{array} \quad \begin{array}{r} 7 \\ - 6 \\ \hline \end{array} \quad \begin{array}{r} 1 \\ + 6 \\ \hline \end{array} \quad \begin{array}{r} 7 \\ - 1 \\ \hline \end{array} \quad \begin{array}{r} 7 \\ - 4 \\ \hline \end{array} \quad \begin{array}{r} 7 \\ - 7 \\ \hline \end{array} \quad \begin{array}{r} 7 \\ + 0 \\ \hline \end{array} \quad \begin{array}{r} 4 \\ + 3 \\ \hline \end{array}$$

7.10a. Addition and subtraction practice - threes and fours

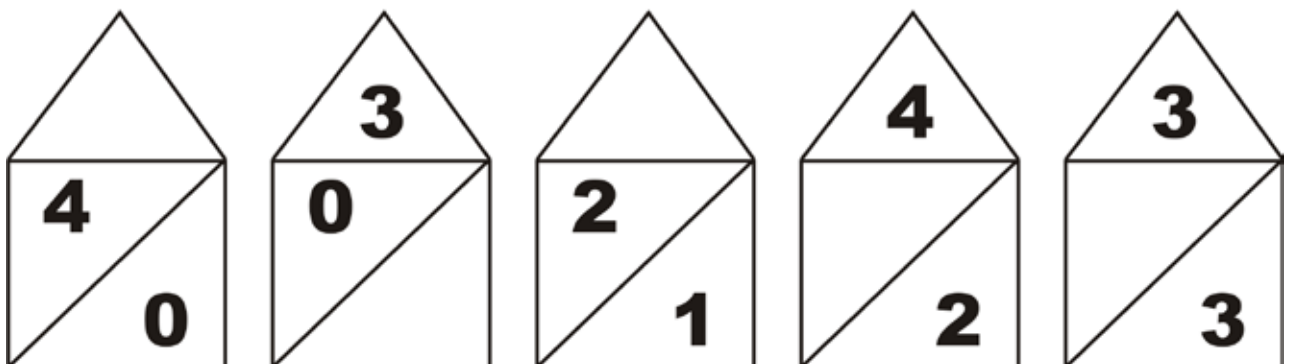
Name: _____



3	4	1	2	3	0	4	1
- 0	- 4	+ 2	+ 2	- 1	+ 3	- 2	+ 3



4	3	3	4	4	3	3	2
- 3	- 2	+ 1	+ 0	- 1	+ 0	- 3	+ 1



APPENDIX C

ANSWER KEYS