Chapter 1
Newsletters

September 10

Dear Room 5 Families,

We're off to a good start in mathematics. So far our emphasis has been on learning how to work cooperatively with a partner and how to use and care for the learning materials in our class. Developing these basics is a prelude to a year of learning how our number system works and having experiences in geometry, data collection, and measurement. As the children become familiar with and responsible for the materials, they are taking charge of their learning, paving the way for a year of investigating, communicating, and most of all understanding the world of mathematics.

For your child this will be a year of solving problems in order to become both a confident and a competent mathematics learner. My approach is to provide experiences for my students that allow them to develop meaningful understanding—meaningful because it grows out of opportunities to think, reason, and discuss their discoveries and conjectures.

You can help by talking with your child about mathematics and being curious and excited about the mathematical ideas we are exploring in class. You'll be learning more about our mathematics program at back-to-school night, in subsequent newsletters, at our parent-teacher conferences, and through homework assignments. Feel free to come to class to see what we're doing. We're having a good time and getting started on a great year of thinking mathematically.

Sincerely,

Nancy

When I send out this beginning-of-the-year newsletter, I have several goals in mind. I want parents to get a beginning understanding of the breadth of what we'll be doing in mathematics; I want to discuss briefly how the children will be learning mathematically; and most of all I want to set an upbeat tone for the year. Rather than talk about the failures of past mathematics programs, I concentrate on the terrific year we have ahead of us as a class. By keeping this introduction simple and positive, I set a tone that says, *Your child is going to have a good year in mathematics; please support our efforts.*

Newsletters are my favorite way to communicate with parents, because they don't have to be hurried through. I decide when to send one home (usually every few weeks), so I can generally take the time to think through exactly what I want to say. Parents can read what I've written at their leisure, digesting the information as they need it. And I've discovered that newsletters do more than inform parents about the mathematics curriculum—they sharpen my own thinking about teaching and learning.

Whenever I write a newsletter, I have a good idea of what I want to say before I begin. I've usually identified a purpose. Often I want to give parents information that will help them understand the current work we're doing in mathematics. Sometimes I'm responding to questions or concerns parents have expressed to me in person. But there's always that element of going deeper into my thinking as I research and compose the letter. When I finish shaping my ideas on paper, I usually have a better understanding of the subject at hand than when I began. I'm much better prepared to explain my thinking clearly to others. By becoming clearer in my own mind about some aspect of the mathematics program, I'm better prepared to meet the needs of the parent community as well.

I've identified three basic types of newsletters. The one I use most frequently tells parents what we'll be doing in class; the second attempts to make it clearer why we're doing what we're doing; the third describes how the math program actually plays out in the classroom.

Explaining What We're Doing

When I begin a unit of study, I like to inform my parent community about it with a newsletter. The newsletter lets parents know what the class will be doing, prepares them for homework assignments that will be made during the course of the unit, and familiarizes them with the mathematical thinking in which their child will engage. I often use as a model the suggested parent newsletter included in the curriculum materials I am using. Here's an example of one I sent home based on a suggested letter to parents in *Place Value Grades 1–2* (Math Solutions Publications, 1994), by Marilyn Burns, part of the Math By All Means series:

November 22

Dear Room 5 Families,

We have begun a new math unit that focuses on place value and estimation. Our place value system allows us to represent any number with just ten digits–0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. Children need many experiences relating large quantities of objects to their numerical representations in order to learn how our place value system works. For that reason many of our beginning activities will involve counting and estimating large groups of real objects (popcorn, lentils, tiles, stars the children draw, etc.). We'll count and recount the same group of objects by 1s, 2s, 5s, 10s, etc., to help the children develop their understanding of counting and quantity.

Children must also learn that symbols have different values, depending on their positions within numbers, and what those values are. The difference between the value of the 3s in 36 and 63, although obvious to adults, is not always obvious to children. We'll be examining number patterns on a 0–99 chart and also relating our number system to money. (Today the children learned a game in which they used pennies and dimes to make a dollar, keeping track of their growing amounts in concrete form with coins and in symbolic form with numbers.)

We've also learned a guessing game that requires the children to compare the size of numbers between 0 and 100. It's called Guess My Number and can be played at home with no special materials. Player 1 chooses a secret number from 0 through 99. Player 2 makes a guess. Player 1 responds with a clue, such as: "Your guess was greater than [or less than] my secret number." Play continues until player 2 figures out the number. (In class we've found out that this language can be challenging. What do we know about the secret number if player 2 guesses 48 and is told "Your guess in less than the secret number"?) In addition to providing number practice, this game also presents children with the opportunity to think logically.

Other activities in the unit will provide experience with ideas in the strands of measurement, geometry, and patterns.

From time to time, the children will be asked to teach someone at home one of the activities or games they have learned in class. These homework assignments will give you firsthand experience with the unit. In that regard, since Guess My Number can be played at home or in the car while you're traveling, I recommend that you play the game at least three times over the Thanksgiving weekend. One game consists of two rounds, with partners alternating between choosing a number and guessing the other person's number.

If you have any questions, please do not hesitate to send a note with your child and I'll get back to you as soon as possible.

Cordially,

Nancy

Almost all the mathematics curriculum materials being published today include similar kinds of newsletters for the teacher to duplicate and send home. In adapting the above newsletter from the published material, I rearranged the text a bit and made it personal to our class by telling specifically what we were doing. I rework suggested newsletters in order to:

1. Create a better match between the information in the newsletter and the audience. The authors of the published newsletters don't have the advantage of knowing the parents of my students. I delete any educational jargon parents might find confusing, and I give the letters a personal touch by explaining just what's happening in our class.

2. Give myself an opportunity to internalize the ideas conveyed in the letter. If I adapt the published newsletters to fit my needs, the language of the "experts" starts to become my language as well. And as I become more comfortable with the language, I understand what I'm doing more deeply and I feel more comfortable explaining what I'm doing to parents.

3. Help parents see that their child's schooling is in the hands of someone who is thoughtful; getting information directly from their child's teacher, rather than from a form letter, gives parents confidence about the experiences their child is having in school. I want parents to know that their children are engaged in a learning program that will support mathematical growth even though it looks different from the mathematics they themselves may have experienced in school.

Explaining Why We're Doing It

As teachers we need to understand the pedagogy that underlies the curricular choices we (or possibly our school districts) have made. When we truly understand *why* we're asking children to do a series of activities, we are able to do our best teaching. We know which questions to ask when a child gets stuck and are better prepared to make choices about when to stay with an activity and when to move on. We are also better prepared to communicate with parents: sometimes parents need to know not only *what's* happening, but also *why* their children are doing particular activities. When they have this kind of understanding, they're much more likely to support our program and be able to help their children at home.

So once or twice a year I send home a letter that goes beyond telling about the activities that we're doing and looks at the pedagogy that informs the curricular choices. Below is an example of a two-part series I sent home to the parents of my second graders.

March 19

Dear Room 5 Families,

This newsletter and the next one will give you an in-depth look at how your child is learning to add and subtract. I'd love to get your feedback during our upcoming parent-teacher conferences.

It's likely that the way your child is doing mathematics in school looks somewhat different from what you remember from your own elementary school days. Most of us learned to add and subtract using a particular algorithm (a rule or procedure for solving a problem). To add, we were taught to "carry," and to subtract we learned to "borrow." We did pages and pages of computation problems that were unrelated to any particular mathematical context. These assignments were designed primarily to help us remember the steps of the procedure we had been shown in class.

Because these methods are familiar to us, we tend to think of them as a standard for judging computational competency. Unfortunately, students frequently learn these algorithms without connecting them to the meaning of the numbers in a problem. And many adults who learned math this way are unable to figure out simple real-life problems. Algorithms were invented to streamline computation. They are useful tools, but because they allow us to bypass an understanding of place value, they are a place to end, not the place to begin.

The shortcoming inherent to our standard carrying and borrowing procedures *as teaching tools* is that they focus attention on the *individual digits* in the numbers rather than on the *quantities* that the numbers represent. Students who forget the steps of the procedure often make fairly outlandish errors without even realizing they've made a mistake. And even when they do follow the procedures accurately, students often don't understand why they got a correct answer. Here are some examples of common mistakes:

$$\begin{array}{r} \\ 58 \\ \underline{+25} \\ 713 \end{array} \qquad \begin{array}{r} \\ 53 \\ \underline{-16} \\ 43 \end{array} \qquad \begin{array}{r} 49 \\ \not{5}\not{0} \\ \underline{-37} \\ 12 \end{array}$$

The good news is that there are many efficient ways to solve computation problems. In fact, second graders are very capable of constructing their own procedures. Suppose a problem calls for adding 58 and 25. Second graders often solve this type of problem by adding 50 + 20 to get 70, then adding 8 + 5 to get 13, and finally adding 70 + 13 to arrive at the correct answer of 83. This method is as efficient as the "carrying" algorithm because it is easy to keep track of, results in numbers that are easy to work with, and takes only moments to carry out. It is superior to the standard algorithm from a mathematical standpoint because the problem solver never loses sight of what the digits represent. And it can be used to solve any similar problem.

Most of us don't know that other cultures have historically used algorithms that are different from those currently taught in American schools. The following example, from an article by Randolph A. Philipp entitled "Multicultural Mathematics and Alternative Algorithms," published in the November 1996 issue of *Teaching Children Mathematics*, shows that some adults from other countries were taught the same procedure in their schools that many of our second graders devise:

> An older man educated in Switzerland and a man schooled in Canada in the early 1970s both demonstrated that they had learned to add by starting

from the left-most column. The man from Switzerland worked the following two problems:

59	481
+16	+926
60	1300
15	100
75	7
	1407

This algorithm is one that many elementary school children in the United States invent when encouraged to do their own thinking. That is, when asked to add multidigit numbers, most children will naturally begin adding the digits with the largest place value. This is quite natural for adults as well. For example, if two friends emptied their wallets to pool their money, would they first count the $20 bills or the $1 bills?

Of course, to solve the problem this way one has to know that a two-digit number is made up of a multiple of 10 and 1s and that numbers can be taken apart and recombined. These concepts are developed in class through games, opportunities to build mathematical models using manipulative materials, classroom discussions, and opportunities to solve many problems. When faced with the task of adding two double-digit numbers, the children use what they've learned about our number system to come up with a procedure that they understand in order to arrive at an accurate answer. Students have a profoundly deeper understanding of an approach they construct themselves *and* they make fewer errors.

Let me know if you have any questions about the ideas expressed so far. I'll continue my discussion next week.

Cheers,

Nancy

March 26

Dear Room 5 Families,

This newsletter continues my explanation of how children learn to add and subtract.

In the case of both addition and subtraction, it is not possible simply to tell children a procedure for doing a problem. Truly understanding what it means to combine two quantities to get a new quantity is a *mental* relationship that children have to make for themselves. The logical-mathematical knowledge needed to solve both addition and subtraction problems develops over time, out of many experiences. We need to respect and encourage children as they move through the natural stages of learning. That process can be uneven and is likely to include periods of confusion as well as learning. Children need an opportunity to form and re-form their thinking as part of the process of developing understanding.

Students typically go through several stages when learning to add and subtract. For example, some students might solve the problem 58 + 25 by starting at 58 and counting on 25 ones (59, 60, 61, 62, . . . 83). These students have developed an understanding of the concept of addition and their method does give an accurate answer. However, counting by 1s becomes difficult to manage and is likely to result in mistakes as the numbers get larger. Our goal for these students is to help them find more efficient methods of adding and subtracting. Over time they will learn to chunk numbers in an addition or subtraction problem so that the numbers are easier to work with. And students frequently can solve addition problems efficiently before they can solve subtraction problems efficiently.

The procedures that students develop in the primary grades can be applied to larger problems. When faced with a problem like 1462 + 1745 + 278, there really isn't any need to use the old carrying algorithm. Instead, one might approach the problem like this: 1000 + 1000 = 2000 and 400 + 700 + 200 = 1300; that brings the total so far to **3300** (jot that figure down to keep track of it); next combine 60 + 40 + 70 = 170, bringing the total up to **3470** (jot that number down); now it's a simple matter of adding 2 + 5 + 8 = 15, bringing the total up to **3485**. It hasn't even been particularly important to line the numbers up vertically. Only three figures have been jotted down in keeping track along the way. And most important, the problem solver can feel confident about the answer because the focus has always been on the quantities represented by the numbers, not the individual digits. Approaches like this one are efficient and accurate for solving virtually any problem. You might want to try making up some hypothetical problems yourself to get a feel for how this approach works.

In the past, too many children ended up disliking mathematics and believing that they were not good at it. We need to turn that perception around. Mathematics is all about making sense, so we need to teach it in such a way that the sense making is always apparent. If young children are given the opportunity to build a firm foundation of *understanding* in the realm of number, they learn that they can achieve mastery over an important part of our world.

Warmly,

Nancy

In writing these two letters, I drew on several outside sources to help me think through what I wanted to say. My goal was for parents to understand that a memorized algorithm is not the only reasonable way to solve a problem. I wanted them to get a feel for how children actually make sense out of performing operations that involve larger numbers. I wrote and rewrote the newsletters several times, asking colleagues to give me feedback before I sent them home.

The response to these newsletters was heartening. Several parents commented that now they understood what their children were doing when they performed calculations. During our spring conferences, some parents told me about the ingenious ways their kids were working with numbers. They remarked that now they understood how their child was able to perform mental calculations so quickly. Other parents mentioned that the newsletters really made sense to them because they themselves worked with numbers in the ways that were discussed. We were able to have an enthusiastic dialogue about the kind of mathematics the children were doing, a dialogue that showed an increased awareness of the learning process.

Writing a *why* newsletter is time-consuming and arduous, but when I'm finished I know I have something I can reuse in years to come. I also feel much clearer in my own mind about my teaching methodology, prepared to explain my methods to even the most ardent naysayer.

Describing the Life of the Classroom

A third type of newsletter, one that captures how mathematical activities play out for the children in class, can also be helpful to parents. A newsletter like this attempts to re-create for parents some of the life of the classroom as children go about the business of doing mathematics. My friend and colleague Suzy Ronfeldt, who teaches fifth grade, first encouraged me to try this kind of letter. I loved the idea because it offered a way to emphasize the positive attitudes that children develop when they're involved in a problem-solving mathematics program. Two of Suzy's newsletters, my favorites, are included in Appendix 1.1.

Another friend of mine, Jan DeLacy, coined the phrase "mathematical moment" to describe what happens when the bulb lights up and a student understands something for the first time or sees something in a new way. This type of newsletter is an attempt to share some of those mathematical moments with parents. Here's an example of what I mean:

> February 25
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> Dear Room 5 Families,
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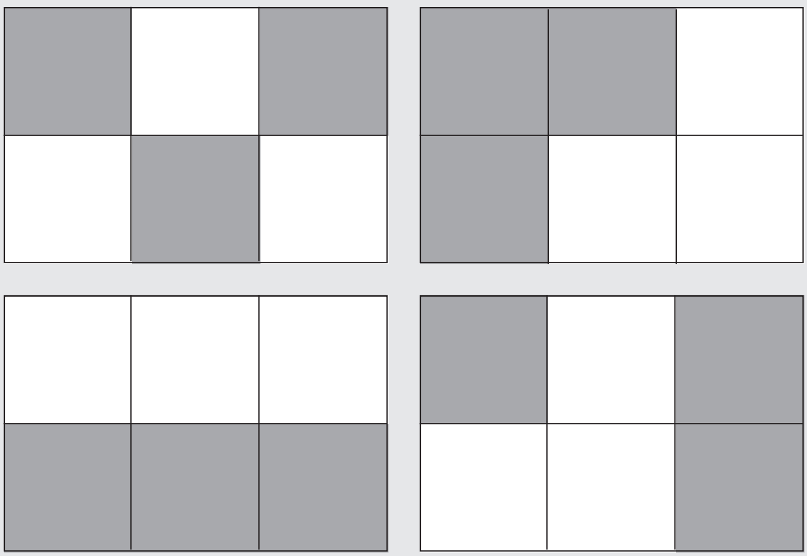
> I thought you might be interested in having a chance to hear about how the children are going about doing some of the activities I mentioned in my recent newsletter about our geometry unit.

As part of our study of geometry we've begun to look at fractional parts of rectangles. On Monday, the children were each asked to create a rectangle using 6 one-inch-square colored tiles. The instructions were to make half of the rectangle blue and half of it yellow. Here are some of their solutions:



After looking at the many different ways the children had accomplished this task, I suggested they do the same thing using seven tiles. I was met with a chorus of, "That's impossible, seven is an odd number." I was delighted to see that the children so readily understood the flaw in my suggestion.

I then asked the class to investigate rectangles made up of 8 tiles, 9 tiles, and so forth up through 36 tiles, each time following the rule of making half of the rectangle one color and half another color. They were to explore which numbers of tiles were impossible. They were also asked to try to find a variety of ways to arrange the tiles for those numbers that were possible.

It was fascinating to see how much problem solving this activity brought about, especially when the children began investigating the larger numbers. There seemed to be widespread agreement that odd numbers were impossible, but no absolute certainty about which of the larger numbers were odd and which were even.

Tanya reasoned this way about the number 15. She explained that 15 includes the even number 10, plus 5 more. Since she knows that 5 is an odd number, she concluded that 15 was also an odd number. "You just take out the 10 from 15 and you're left with 5. That's how I know that 15 is impossible to make half and half." The look on Tanya's face when she described her thinking was priceless. She was full of confidence and delighted at her ability to think this one through.

I was delighted with Tanya's approach too. First, she was applying logical reasoning to figure out the answer for herself. That empowers her to figure out many more answers in the future. Second, she used her ability to decompose the number 15 into the component parts 10 and 5. This is a concept we've been working on all year in our study of number. It was great to see Tanya apply this understanding when solving a geometric problem.

For other children a checkerboard arrangement of two colors became a popular way of solving the problem. This method seemed to work well and it was easy to set up. Visually it gave the appearance of being correct. I asked Lana how she could prove to me that this method worked for any number. She decided to count the two colors of tiles that she had used for a checkerboard rectangle based on a 5-by-7 array (for a total of 35 tiles). She found that it was actually composed of 17 yellow tiles and 18 blue tiles. That sent her back to the drawing board to look for more accurate ways to determine whether her rectangles were half and half. What was impressive here is that Lana persevered in checking out her checkerboard theory. She was disappointed, but undaunted, when she discovered a hole in her thinking. She went on to try out many other ideas as she worked on the problem. She functioned as a mathematician working diligently and honestly on a significant problem.

This week's homework is an extension of our work with halves. Let me know if you have any questions or notice your child making any great discoveries when solving the homework problems!!

Cordially,

Nancy

A newsletter like this usually grows out of a situation that happens spontaneously in the classroom. To make sure that I capture some of these moments, I try to have a pad of paper close at hand on which I can jot down a few notes about the interaction. I try to think through not only what happened but also how I might describe the child's attitude and why I think the event is mathematically significant. Knowing that I want to be able to recapture some of these moments in writing encourages me to be a careful observer of what my students are actually doing every day.

Student work is also fodder for this type of newsletter. I like to pick out examples from a class set of papers that shows a variety of ways that children go about solving the same problem. This brings home the notion that there are many ways to solve a problem and that students benefit from having a chance to find the way that makes sense to them.

As I do more newsletters like this in the future, I'll keep track of which children get highlighted in each newsletter and make a point of finding ways to include everyone by the end of the year. I'll also make a real point of giving parents models of how to ask questions of children in ways that encourage them to think.

Using Today's Technology

When I was an English major in college I would start a writing assignment—an essay on a piece of literature I'd read, for example—by getting out a pad of yellow legal paper and a pen that felt comfortable in my hand. Frequently, I'd begin with almost no idea of what I was going to say. I'd jot down a few thoughts, reread what I had written, make some changes, and then say to myself, *Oh, yes, that's what I think*. I'd continue in this fashion, slowly building up an argument through the conversation that took place between the pen and paper and me. When computers first came along, I was sure they were not for me: it was the feel of the pen in my hand that got my thinking going.

Nowadays when I'm ready to write a newsletter, I first identify the type and purpose and then gather the background materi-