

Chapter 1

BEFORE THE CHILDREN ARRIVE

Thinking through your math program before the first day of school enables you to set the stage for a productive beginning and a purposeful year. In planning your year, you'll want to consider the following:

- setting up the classroom for mathematics learning
- planning daily instruction
- helping children develop number sense
- organizing student work
- integrating assessment into instruction ■

Setting Up the Classroom for Mathematics Learning

The practical task of arranging furniture and designing your classroom space will influence everything from traffic patterns to accessibility of materials. Keep in mind that various math activities will involve several different groupings of children—including group, partner, and individual work. As you arrange the room, reserve a space that is large enough for whole-class interaction. This *circle-time* area will enable you to share information and orchestrate class interactions in a relaxed and comfortable setting. The area can also provide space for partner activities.

A classroom set of first-grade math materials will ideally include sorting and counting sets, pattern blocks, and interlocking cubes (Unifix, Multilink, or Snap Cubes). Geo blocks and Cuisenaire rods are also versatile and useful. During the year, you will also want access to face (analog) clocks, rulers, plastic or real coins, and balance scales. Many schools have limited collections of math materials and expect that teachers will share them among classrooms. Sharing requires careful planning and coordination so that you have the necessary materials when you need them.

Reserve some wall space in order to display materials, like calendars, that you plan to use throughout the year. Also reserve wall space for attendance and lunch-count information. In addition, the calendar area is a good place to mount a 1–100 pocket chart that can be used throughout the year. As your students' math vocabulary develops throughout the year, keep a list of math words and ideas to remind children about relevant terms and symbols. Reserve some wall space—your class's "math wall"—for this list and for photos of student work, graphs, and other math products created by students throughout the school year. The children will begin to expect their work to appear in this designated area, and will take pride in seeing it displayed.

The room's layout should also reflect first graders' increasing independence and ability to follow directions. Easy accessibility of clearly marked materials will allow children to get what they need when they need it, and will encourage them to return the materials in an orderly way. Students will gain confidence when they realize they can consistently find needed materials in a predictable place. In your classroom, you may have some math materials—such as connecting cubes, counting sets, and pattern blocks—always out in the open and available to children, while others will be stored and brought out for occasional use. Organization is a key to success in either circumstance.

Planning Daily Instruction

Each day in the classroom should ideally include about sixty total minutes devoted to math. As you plan instruction for the upcoming year, think

about the structure of your lessons. What math routines, such as calendar and warm-up activities, will you include on a daily basis? How will you balance the rest of instruction with whole-class discussions, partner work, and individual assignments? How can you draw on different types of experiences—such as building lessons on children’s books, using particular manipulative materials, or drawing on classroom experiences—to pose problems?

Make class discussion part of your regular schedule. Through discussion and conversation, children hone their listening skills and learn to articulate their mathematical thinking. But avoid always scheduling class discussions for the end of the day’s math session. Children are often better able to focus at the beginning of a lesson, so plan a variety of processing times to maximize these exchanges.

Helping Children Develop Number Sense

Children who have number sense make reasonable estimates, see the usefulness of numbers, and understand relationships among numerical quantities. Throughout the year, you’ll introduce a wide range of contexts to help students expand their understandings about numbers and the interrelationships among them. Specifically, first graders focus on:

- counting objects with accuracy.
- grouping quantities (e.g., by 2s, 5s, and 10s).
- developing understandings of the relationships between amounts (greater than, less than, equal to).
- adding and subtracting quantities.

Children need opportunities to revisit these same ideas again and again by encountering mathematical situations and solving problems.

Keep in mind, however, that young children’s ability to understand sophisticated ideas is complicated by limitations to their thinking. These constraints are normal aspects of human cognitive development. For example, young children need time to develop *conservation of number*. When a child conserves number, he or she realizes that amounts don’t change just because the arrangement or position of the objects involved has changed. A child who does not conserve might think that there are more marbles when they are spread out than when they are packed closely together, or vice versa. If a child believes that the *number* of objects changes because the objects’ positions have changed, he or she may struggle with other numerical understandings. For instance, if Mona does not conserve number, she may not understand that $5 + 1$ represents the same total as $3 + 3$.

You can support your students’ development of conservation by offering contexts and problems that help them make sense of numbers, respecting

the fact that maturation is a natural and predictable part of this process. Asking questions of, listening to, and carefully observing children while they work will help you select appropriate activities for them and challenge them without overwhelming them. Throughout this book, you'll find routines and activities that provide choices and varied levels of complexity. Use what you know about your students to design your specific plans.

Organizing Student Work: Math Folders and Notebooks

First graders are just beginning to develop the ability to put their ideas on paper. Every effort to communicate mathematical thinking in written and symbolic form is a step forward for these young learners. It's useful for each child to have a pocket folder labeled for math work that he or she uses to store papers.

You'll also find references to math notebooks throughout this book. These notebooks serve several purposes. Children use them to write and draw about math ideas as they're working to solve problems. They also use them to record new symbols they've learned. You can also provide materials that the students will tape into these books; for instance, trimmed copies of 1–100 charts and copies of math menu choices so they can keep track of their personal selections.

As the children record and organize their ideas, don't expect the resulting contents of their math notebooks to look orderly and polished. It may help, however, if each time children make a new entry, you specifically remind them to turn to the next blank page in their notebooks and put the date at the top of the page. The main purpose of the notebooks is to give children a personal and comfortable place to try out and record mathematical ideas.

Math notebooks can be simple spiral-bound notebooks labeled *Math*. You might write the word *Math* on some sticky labels ahead of time and have each child attach one on the front of his or her notebook. If spiral-bound or composition notebooks are not available, create notebooks using standard-sized notebook paper with construction-paper covers.

Integrating Assessment into Instruction

Teachers participate in countless spontaneous exchanges with their students. Listen carefully and observe the ways children are responding to problem-solving situations. The exchanges between your students and you shed constant light on young learners' abilities. In addition, regularly conduct specific assessments that gauge students' mathematical capacities; for example, finding out if they can sort with consistent criteria or count objects one at a

time. You can use these same assessments to gauge students' comfort levels, strengths, and limitations, and to see how specific individuals respond when something doesn't make sense. You can also observe the ways in which children cope with their peers, with their own reactions to competition, or with uncertainties about their adequacy.

Moreover, you can use information about your students to extend their thinking and fuel their curiosity. It is a simple thing to take a few minutes now and then to discuss with an individual child what he or she has been working on or is thinking about. Listening carefully to responses and then asking further questions can provide powerful encouragement to students.

Of course, asking effective questions can prove more challenging than we might imagine. Good questions are often open ended; that is, they do not call for a "yes" or "no" response or a predetermined "answer." Open-ended questions require genuine interest in the child's response. As teachers, we often have an academic "destination" in mind, and it's easy to fall into the habit of listening for "the right answer." Try to resist this habit. Though it's important to introduce the concepts students will need to master math, each child travels a unique path to those understandings. Following a *learner's* train of thought can help you make thoughtful choices about lessons and activities.