



introduction

Sadly, most of what we think we know about math is mistaken. We may think that math is hard. We may think that it is about right and wrong answers. We may have learned that there is only one way to solve math problems and that we need to have someone teach us what that way is. We may think that math is about memorized facts and that the only way to get good at it is by repetitious drill. And perhaps worst of all, we may think that math is dreadfully, dreadfully boring. Fortunately for us, none of these statements is true.

So how did we come to be so mistaken about math? Probably because most of us were taught math this way—through endless drills, with an emphasis on solving problems a particular way and coming up with the right answers. This means that most of us were, in fact, taught very little math at all. Math is about thinking and problem solving. What we were taught instead was arithmetic. Arithmetic is about computing answers, usually by plugging numbers into fixed rules and formulae. When the emphasis is on teaching arithmetic, there is little time to talk about where mathematical procedures come from or why they work or how other people in other times did math differently. The tragedy of all this is that it is arithmetic that confuses young children, not math. Children are natural mathematicians, but when we prematurely emphasize arithmetic, we cut them off from developing—and trusting—their mathematical minds.

It is no wonder that we tend to teach math in developmentally inappropriate ways, through the same sort of drills and rote memorization we were taught. It is also understandable that most of us in early childhood education have concluded we should spare the little ones from being burdened by math as long as possible. For now, we say, let them be children. The sad truth is that few young children in this country spend time in settings that regularly and deliberately encourage them to engage in deep mathematical thinking. The number of people who are skilled at creating these experiences for children is rather small, and it doesn't include the vast majority of people who actually work with young children on a day-to-day basis.

However, it's not the fault of the frontline troops that too little high-quality math is done in early childhood settings. The fault lies instead with those of us who know how to provide these experiences. We teach our college courses, and we lead our professional development workshops and in-services, and then we leave, knowing full well that without further modeling, encouragement, and material support, most of our advice won't make it into the classrooms of the practitioners we just taught. If we want to do a better job of getting our ideas into widespread use, we need to put into teachers' hands some practical tools that can help them create powerful, stimulating math environments without becoming math experts themselves.

This book is my attempt to provide those resources—to move a step beyond the you-should to the here's-how-to stage. Between these covers you will find a large number of high-quality starting points for hands-on, developmentally appropriate mathematical inquiry. I believe that these activities can help you get started on the right path. Once on that path, I think you'll stay on it, because you and the children will realize together that mathematical learning can be deep and strong, without coercion and pain. You'll also discover what you knew all along but forgot somewhere on the way: we are by nature mathematicians, and doing math is fun.



The Goals of This Book

If this book accomplishes its purpose, I hope we will see more math that is more appropriate and individualized being done more often and by younger children. It's worthwhile to spend a moment clarifying what I mean by each of these objectives and why I think each is important.

More Math

Traditionally, we don't include enough math materials in the environments we set up for young children, nor do we engage in enough mathematical interactions and conversations with children. This book will help you incorporate more math materials into your classroom so that children will have plenty of opportunities to explore mathematical concepts.

More Appropriate Math

Most of the math that we do introduce to young children focuses either on rote counting or on learning the numerals 1 to 10, activities that don't fully challenge them. Some providers move to the opposite extreme and start drilling children on arithmetic algorithms (that is, the specific steps needed to figure out a math problem). Both of these efforts are misguided. In the early years we should provide children with a broad range of experiences and activities to help them develop their logical-mathematical minds through flexible mathematical problem solving. The

activities in this book are all open-ended and hands-on. They include variations for exploring concepts in many different ways. Math is more than mere counting, and it has little to do with memorizing steps.

More Individualized Math

Many of the math activities children experience in early childhood settings are teacher-led or done as a group and don't take into account the wide range of abilities and interests among individual children. Most of the activities in this book are of a different sort: they are child-directed, meaning that children can choose when and how they want to engage with them. When children self-select activities at opportune times individually, in pairs, or in small groups, the task can fit their current needs and interests. This maximizes their learning.

Math More Often

Math tends to be a minor presence in most early childhood settings, and the math activities that are present tend not to rate very high on the excitement meter. As a result, not much math gets done. In fact, most of the high-quality math young children do in early childhood settings occurs spontaneously during otherwise non-mathematical events, such as dramatic play or block play. Such moments are important, but they are not sufficient. In this book, you'll find any number of ideas for building math into your classroom so that math games and activities become a staple of your learning environments.

Math at a Younger Age

We tend to hold off on doing much challenging math with young children in order to save them from premature academic study (often termed *push-down curriculum*). Young children are ready now for the math I outline here; they can begin exploring the early activities at as young as two years of age.



Imagine Math in Your Classroom

If we change our understanding about what math is and how children become good at it, a whole new world emerges in our classrooms. Wouldn't it be nice if

- you could stop worrying about forcing children to learn math because you see your children enthusiastically choosing the math activities you add to their environment—and asking for more?
- you could stop resisting standards because you send the children in your program into the early grades as already enthusiastic and productive mathematicians?

- you had the tools to help young children who are already falling behind their peers and who view themselves as mathematical failures—and those tools did not rely upon dull, repetitive drills?

This book is an important resource in getting you and your children there. I encourage you to experience the mathematical sophistication, intelligence, and enthusiasm that young children demonstrate when you provide them with mathematical materials and experiences that are developmentally appropriate yet still challenging. These experiences don't need to be forced upon children. They're hungry for them. So let's begin.