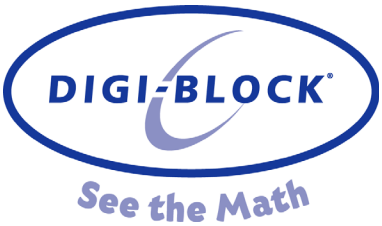


Kohlberg's **Digi-Block**

Mathematics

Lesson Plans and Worksheets

Volume 1: Pre-K and Kindergarten

First Edition

Digi-Block, Inc.
12 Eliot Street
Cambridge, MA 02138
888.834.4466

Author: Dotty Corbiere
Contributing Author: Kate Damon
Producers: Michelle Alves and Gavi Kohlberg
Graphics and Illustration: Off the Ground Design

Based on the teaching method developed by Elon Kohlberg, founder of Digi-Block

About the Author

Dotty Corbiere is the math coordinator at the Meadowbrook School in Weston, MA. She began using the Digi-Block program in 1997 and has experienced tremendous success. Digi-Block has improved Meadowbrook's math program and allowed heightened expectations for each child at each grade level. She has written and developed books and resources for Digi-Block based on her own classroom experiences.

About the Founder

Elon Kohlberg, Ph.D., is a mathematician and professor at Harvard Business School. Digi-Block was formed out of his passion for showing children the beauty and simplicity of elementary mathematics.

Copyright © 2006 Digi-Block, Inc.
Permission is hereby granted to teachers to reprint or photocopy the worksheets in classroom quantities for use in their classes. Such copies may not be sold and further distribution is expressly prohibited. All other rights reserved.

Printed in the USA

Digi-Block® is a registered trademark of Digi-Block, Inc.

www.digi-block.com

Introduction

by Dr. Elon Kohlberg, Founder, Digi-Block

Digi-Block is a method for teaching Number and Operations. Its promise sounds too good to be true: Your students will have fun, they will experience the joy of figuring things out, and they will become proficient in the most demanding algorithmic procedures.

How is this possible? The key to number and operations is a clear grasp of our number system, in particular the notion of place-value. When a child understands the meaning of numbers written in base-10, then the operations we do with those numbers make sense.

Digi-Block provides a physical model of the number system that is so concrete that even four-year old children can easily manipulate it; at the same time it is so accurate that it provides a clear image of the algorithms, from simple addition and subtraction all the way to advanced procedures such as long-division and multiplication of decimal fractions.

A great advantage of working with Digi-Block is that the same physical model is used from kindergarten through sixth grade and beyond. Thus the child's experience and confidence are cumulative.

Since Digi-Block published its first teaching manuals, we have been elated to see the success and joy experienced by many teachers. However, these teachers had to work hard in order to translate our conceptual manuals into concrete teaching plans. Here, we provide a different kind of teaching manual. It is written with the recognition of the impossible demands on today's classroom teachers, which limit the time and energy available for creating their own teaching plans.

This book provides teaching plans for the first steps in the Digi-Block program. Children play with the blocks and use them to learn the concepts of kindergarten math. While all the activities are valuable in their own right, their greatest importance is in getting the children comfortable with the blocks. This way they will confidently make the transition to the more advanced work in later books.

In this book (volume 1) children start with the numbers 1-10, move to the teen numbers, then to addition and subtraction of numbers up to 20. The next book (volume 2) deals with numbers up to 100. It emphasizes the idea of blocks on a train, which is a particularly clear way to grasp two-digit numbers and their addition and subtraction.

The teaching plans and the worksheets in this book are based on more than five years' experience of a number of wonderful teachers, most notably Dotty Corbiere of the Meadowbrook School in Weston, Ma. There are no words to describe the excitement and the pride students experience in her math classes. We hope that this book will enable you to create the same experience in your own classroom.

Contents

Chapter 1: Numbers to 20

For Teachers: A Brief Overview of Digi-Block Before You Begin

Digi-Block is a hands-on system for teaching elementary math. Math is easier and more fun when students can ***see*** the base-10 number system. The National Council of Teachers of Mathematics (NCTM) recently revised its standards, renewing its emphasis on developing strong number sense early on. Using Digi-Block in your classroom will enable you to effectively model patterns in counting, to show how numbers "compose" and "decompose," to demonstrate basic operations to and give meaning to the concept of place value. Digi-Block enables students to model, visualize, represent and ***explain*** the most fundamental concepts of number sense.

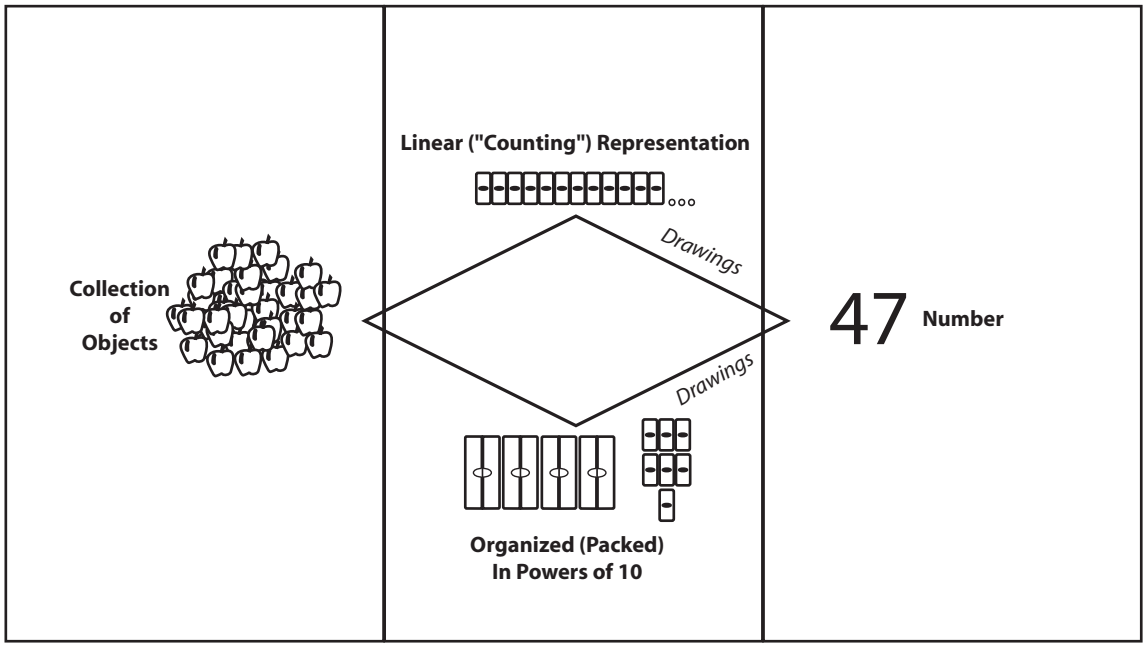
The aim of this book is to break the Digi-Block curriculum into straightforward daily lessons with ready-to-use worksheets. The lessons are presented chronologically to minimize teacher prep time. However, we strongly recommend that you become familiar with the overall Digi-Block method, preferably by participating in an in-service training, by consulting the tutorials on our website and/or by reading the *Comprehensive Teacher's Guide*.

The Basic Building Blocks

At the core of the Digi-Block program is a system of small rectangular blocks and empty holders. These materials enable children to discover for themselves the important relationship between ones and tens. When the smallest holder is filled with exactly ten single blocks and covered with another holder, it forms a new block. This block-of-10 looks just like a single block except that it is ten times as large. Ten of these blocks-of-10 can then be packed into a larger holder to create a block-of-100, which is, again, ten times as large. These blocks-of-100 then pack into the largest holders to make a block-of-1000 with the same repeating shape.

Modeling Numbers

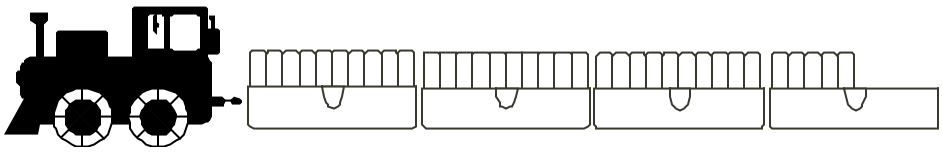
A number can be represented in four ways (see graphic). Ultimately, students should be able to make the transition from one representation to another, completing problems with physical models, drawn models, and numerical representations.



The Train Model

Trains are made by placing small holders in a line behind an imaginary engine. These small holders become the cars of the train. The main rule for trains is that **all blocks must be loaded from left to right as close to the engine as possible**, thereby simulating a number line. The holders organize the blocks in groups of ten, which fosters students' learning of several key concepts, including:

- Recognizing full cars (tens) as separate units from individual blocks (ones)
- Counting by ones
- Counting by tens
- Grouping tens with tens and ones with ones for efficiency when adding and subtracting



A "good" train

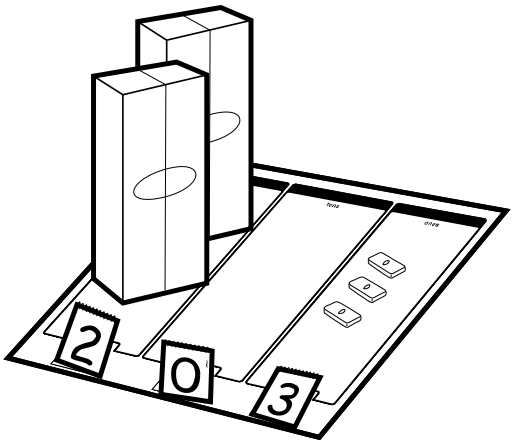
Train engine cut-outs are be available in the Appendix of Volume 2, as trains are introduced in Volume 2.

The Packed Blocks Model

When students are proficient counting and doing addition and subtraction with trains, students can **cover the full cars**, thus making **blocks-of-10**. It is essential that students first master these skills with trains when they can see individual blocks in each holder before advancing to the **packed view,** when they must know intuitively that ten ones and one ten are equivalent.

Working with packed blocks helps students understand that:

- each unit contains ten of the next smallest unit and that this pattern could extend infinitely in either direction
- a set of blocks is packed as much as possible when there are no more than nine of any size showing
- blocks should be organized by grouping them by size and by arranging them in descending order
- each digit of a number represents how many of each size there are
- zeros are essential placeholders

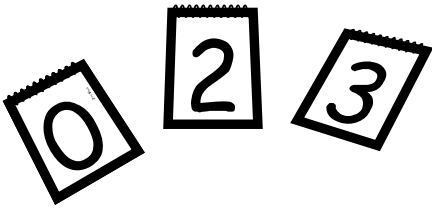


Place Value Mat with Blocks and Digit Flip Cards

Additional Materials

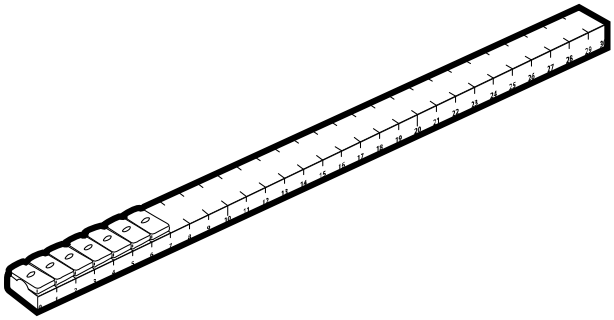
Digit Flip Cards

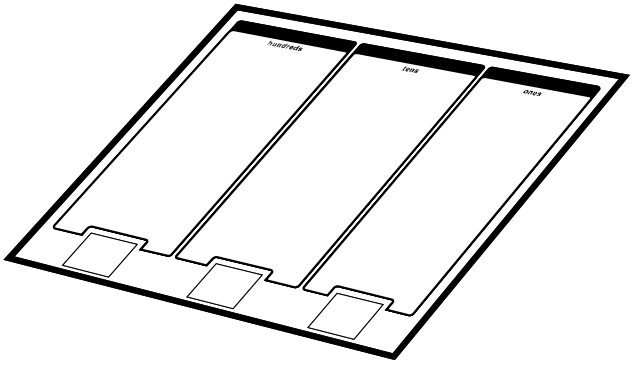
Digi-Block Digit Flip Cards are spiral bound cards, one each for the digits 0-9. They are initially used to recognize the digits and then to recognize that there can be only one digit in each place. When the 9 digit card is reached, the next flip will reveal the 0 digit again, signaling the need for an additional set of cards to represent the tens place. Paper digit flip cards can be substituted if your classroom does not have Digi-Block Digit Flip Cards.



Number Lines

Digi-Block Number Lines (0-30) hold single blocks flat along the top surface. One face shows hash marks with the numbers 0-30; the opposite face shows only hash marks. The tabs at each end and the top coating of the plastic number lines keep the blocks from sliding off. This type of number line is much more concrete than the traditional number line because the students are counting the number of blocks rather than the abstraction of a line or a space between lines. Paper number lines (provided in appendix) can be substituted if your classroom does not have Digi-Block Number Lines.



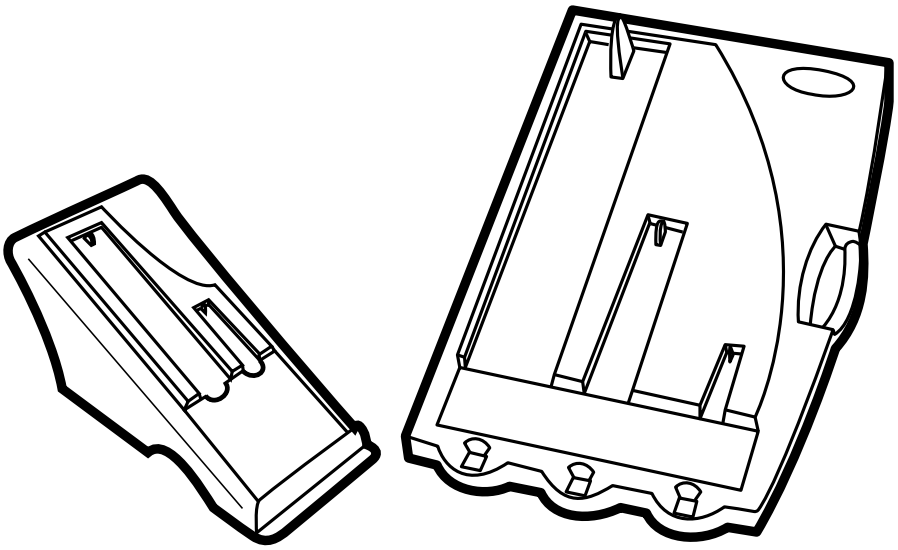


Place Value Mats

The Digi-Block Place Value Mat is an 18” x 14” laminated mat for organizing the blocks into places. The folding mat has three panels labeled Hundreds, Tens and Ones with designated areas for Digit Flip Cards at the bottom of each place. The mat can be written on with dry-erase markers. Place value mats are not introduced until Book 2. Paper templates for photocopying will be provided in the Book 2 Appendix if Digi-Block Place Value Mats are not available in your classroom.

Counter

The counter is an excellent way to **organize packed blocks** for counting, addition and subtraction. One holder of each size is held in place so that single blocks can only be loaded into the ones' place, blocks-of-10 can only be loaded into to the tens' place, and blocks-of-100 can only be loaded into the hundreds' place. Each holder can hold up to nine blocks. When a tenth is inserted, the holder "pops out" and slides down the ramp, signaling the student to put a cover on it, converting ten units into one of the next unit, and to load it in the next column. Students and teachers alike love the "eject" mechanism!



2-Place (Student) Counter and 3-Place (Demonstration) Counter

In recognition that the only Digi-Block materials some classrooms may have is blocks, this book was purposely designed to require only blocks. Since the counter can not be made from paper as the number lines, digit flip cards and place value mats can, the counter is not used in the lessons in this book. However, it is a valuable tool that students love to use. *Pattern of the Count* is an excellent Kindergarten lesson that uses the counter. It and other additional lessons can be found on the Digi-Block website in the "Lesson Plans and Activities" section.