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# Introduction



The *First-Grade Diary* is a daily log of the progress of a group of 20 primary-grade children in the mathematics laboratory in 1960–61. Most of the children in this class had participated in a readiness program in kindergarten, where they had many free-play sessions with Cuisenaire® rods and other concrete materials. Often they were able to grasp concepts more rapidly and easily than is usual for first-graders and were free to move ahead to new concepts and activities.

The *Diary* was originally kept as a cumulative case history of a specific class to refine methods and procedures for the benefit of future classes. It records games, materials, sequences of developmental activities, and children's responses and insights into mathematical concepts. The learning experiences of these children throughout the school year, their successes and their failures, are described here as an example of one approach to teaching mathematics to a group of first-graders. The children's rapid progress, enthusiasm, and independence indicated that these classroom notes might be of interest and help to others.

Entries for the first part of the school year (September through January) are detailed accounts of the actual daily work of the children. They include diagrams of a variety of concrete materials and teaching aids, specific references to Cuisenaire® rods and to some of the lab sheets as they were used in the activities of the first-grade class. Many of the group activities were recorded in dialogue form so that the responses of the children—even their errors—might illustrate their thinking in the process of discovering certain mathematical concepts. In addition to the actual descriptive class notes, records of work with individual children and evaluations of pupil progress are included.

By the end of January, the children spent most of their time working independently on written materials. The class notes for February through June have been brought together under topics so that instruction for any particular subject can be pursued as far as children require.

The *Diary* is not intended to serve as a manual in the traditional sense, and the teacher is cautioned against following it as a daily guide. It is hoped that

teachers will be inspired to develop their own methods of presenting the materials. Since no two groups of children are exactly alike and no two teachers are exactly alike in their style and technique, no two first-grade classes should be expected to follow the same path in learning mathematics.

Teachers who have used the *Diary* report that it has served as a ready source of stimulating ideas. Many of those who teach grades higher than the first have found useful ideas for remedial and review work. We hope that teachers will be inspired to build on this diary, to keep diaries of their own, and to develop their own personal approaches to the Mathematics Laboratory Materials.



# September

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## Summary of Topics

Order  
Inequalities  
Establishing unit  
Building rod patterns  
Counting  
Numeral recognition  
Recognizing number groups  
Ordering numbers  
One-to-one correspondence  
Tallying  
Arithmetic operations  
Fractions  
Geometric recognition



## Work with Cuisenaire® rods



### I

#### **Free play with rods (10 minutes)**

Piles of assorted rods were placed on each table. The children were free to build with the rods. (The majority of the children had attended the kindergarten at Miquon School and had been exposed to the Cuisenaire® rods previously.)

- 1 Four boys built a “water plant,” a “piping system,” and an “oil refinery.” Other children built pyramids, flat patterns and designs, houses, and boats.
- 2 Free play ended with a trip around the room to inspect each other’s buildings.

### II

#### **Group activity:**

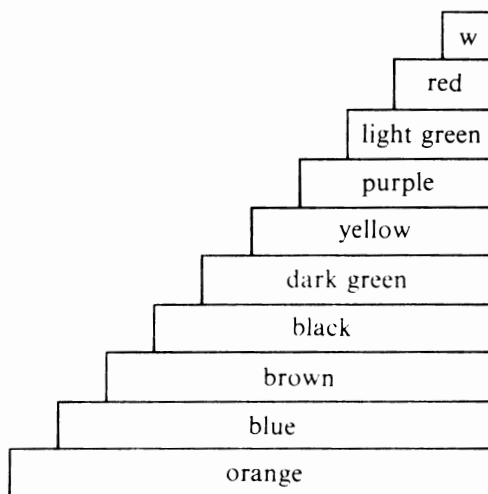
#### **Discovering one-to-one correspondence**

A pile of assorted rods was placed on each table.

- 1 Lore picked a yellow demonstration rod and held it up in front of the class. The children responded by each picking a yellow rod from his collection of rods. Then Lore held up a red demonstration rod and the children held up a red rod. This procedure continued until the one-to-one correspondence between the demonstration rods and Cuisenaire® rods was established. (The demonstration rods are homemade and cut on an inch scale, while the Cuisenaire® rods are cut on a centimeter scale.)

- 2 Lore picked a white demonstration rod and gave the following direction: Start with the white rod and build a color stairs.

The children built color stairs with Cuisenaire® rods. (Only two children had “gaps” in their stairs.)



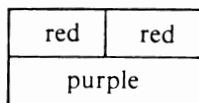
The color stairs

### III

#### Game: “Half of”

Children entering first grade seem to understand the concept of *half*. This probably stems from early experience in sharing with other children—breaking a cookie “in half” (two equal or nearly equal pieces).

- 1 Lore: Find the rod that is “half of” the purple rod. Find “half of” the red rod. Find “half of” the dark green rod. Find “half of” the orange rod.
- 2 The red rod is half the length of the purple rod.



The white rod is “half of” the red rod; the light green rod is “half of” the dark green rod; the yellow rod is “half of” the orange rod. (The children appeared to grasp this concept easily.)

## IV

### A close look at the white cube

Directions from Lore and children's responses:

- 1 Lore: Select one of the little white blocks from your collection of rods. This is called a *cube*.



- 2 Lore: Press the face of the cube against the fleshy part of your thumb or your arm. The shape you see is called a square.



- 3 Lore: Make a stamp of the edge of the cube on your hand. What do you see?

Children: A line. —

- 4 Lore: Press the corner of the cube against the fleshy part of your thumb or arm. What do you see?

Children: A dot. A point. ●

- 5 Lore: How many "faces" does the white cube have? [Children's answers ranged between four and seven.]

- 6 Lore then held up a white cube and asked the children to count the faces.

## V

### Comments

Jeff and Anne were able to measure with a ruler (centimeter scale) and read off the heights of the pyramids they built during free play. Jeff found not only that his pyramid was 21 centimeters high, but also that it was made up of 21 layers of rods.

About half of the children participated easily in some oral responses to these problems:  $3 + 3 = \square$ ;  $4 + 2 = \square$ ;  $5 + 1 = \square$ . These were introduced in the course of the discussion about the rods.