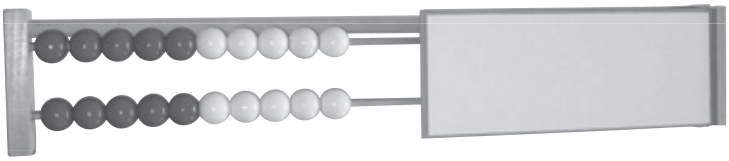
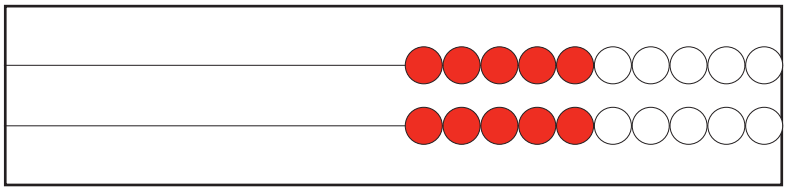
Introduction to the Rekenrek

The Rekenrek (or arithmetic rack) was designed by Adrian Treffers, a mathematics curriculum researcher at the Freudenthal Institute (part of the University of Utrecht) in the Netherlands, to support the development of children's addition and subtraction strategies. This tool was designed to support the natural ways that children develop mathematical understandings and to encourage them to use strategies like doubles or near doubles, and "thinking 10" in place of counting from one or counting on to solve addition and subtraction problems. Along the way, children develop a better sense of number relationships that form the basis for efficient calculation and allow for quick recall of math facts.



IMPORTANT NOTE: The starting position for work with the Rekenrek is with all beads to the child's right, with the white beads on the right end of the wire. The child enters a quantity by sliding the beads to the left and reading left to right. If this procedure is not followed, it will not be as easy to visualize the number of beads on each row. Establishing this as the starting position ensures that everyone in class is visualizing the patterns in the same way and communicating about these patterns in the same orientation.



A Rekenrek is composed of 2 rods with ten beads on each rod. Each rod is composed of 5 beads of one color and 5 beads of another color. The most frequent combination of colors is 5 red and 5 white beads. This "five structure" offers visual support allowing the quantity of five to be visualized as a whole. Soon the child will see that 7 is just 2 more than 5 and thus will see the 7 as "chunks" or groups, rather than as 7 individual beads to be counted.

By conceptualizing numbers as groups, instead of as things to be counted, students are able to see early on how they can combine numbers to make other numbers. The grouping of beads in two colors and two rows also invites students to investigate the relationships between, and nurtures the use of 5s, 10s and doubles as points of reference for mathematical thinking.

The Rekenrek is a powerful tool in the teaching of problem solving as well. Some of the potential uses of the Rekenrek for problem solving include:

- Modeling mathematical situations. "There were 8 children playing on the playground and 4 more children came to play. How many children are on the playground altogether?"

- Modeling student strategies for problem solving. The teacher uses the Rekenrek to represent the student's mental thinking strategies. "So, you thought about 6 and 5 being the same as 5 and 5 and 1 more." Teacher shows 6 beads on top row and 5 on the bottom row and points out the 5-5 pattern of the red beads and the 1 white bead.

- Using the Rekenrek as a tool for thinking about mathematical situations. "8 and 8 is 16 because it's the same as having 2 fives and 2 threes, which is 10 and 6. That's 16."

While the Rekenrek is a potentially powerful tool to help children grow in their development of mathematics, teachers may need direction in its thoughtful use with children. It is the goal of this book to help teachers see when, why and how to use the Rekenrek effectively so that **all** students can move forward in the development of fundamental mathematical concepts, and develop efficient and flexible thinking strategies.