

## Rekenreks



### What are Rekenreks?

Rekenreks are arithmetic racks, developed by Adrian Treffers, a mathematics curriculum researcher at the Freudenthal Institute in Holland. There are two rods of 10 beads. Each rod has 5 beads of one colour followed by 5 of another colour. The

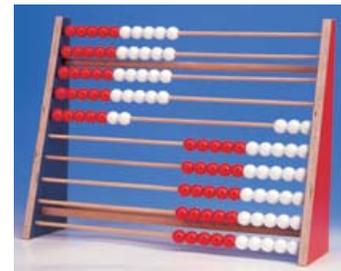
order and colours on the top rod are repeated on the lower rod. The colours most often used are red and white. The starting position should show all the beads pushed to the far right. The student enters a number by sliding the beads to the left in a one-push motion. It is important that everyone in the class is visualizing and communicating the patterns in the same way.

### How do Rekenreks help students?

Rekenreks are used to help develop addition and subtraction strategies, such as doubling or finding near doubles as well as thinking in terms of 5s and 10s, instead of counting from one each time or counting on in addition and subtraction. Students improve their ability to regroup numbers when solving addition and subtraction problems.

### How many are recommended?

It is recommended that each child have a Rekenrek to represent/visualize mathematical thinking. It is also recommended that the teacher have a large demonstration Rekenrek which is visible to the whole class for shared activities.



### Sample Activities

1. To introduce the Rekenreks, push all ten beads from the top row to the left and cover the bottom row(s). Students do the same on their individual Rekenreks. Ask the students what they notice.
2. Push various numbers to the left and ask the students to quickly tell how many beads they see. Start with 1, then 5, 7, 9, 12, 16, etc. Ask students how they know how many they see and listen for answers that involve visualizing 5 and 10, or seeing doubles, as opposed to counting individual beads.
3. Reinforce the idea of showing a number on the Rekenrek in “one push.” Ask students to explain how they knew they were pushing the right number. Notice reasoning that involves visualization of 5s and 10s, as well as doubles.
4. Model mathematical situations such as: 8 birds were eating crumbs in the park and 4 more came to eat. How many birds were there altogether?
5. Use the Rekenreks to model student thinking, e.g., Did you think of 7 as two more than 5? Show that 5 red beads pushed together with two additional white ones does make 7.
6. Use the Rekenrek as a tool for problem solving, e.g., When you add 6 and 5, you can see it as 5 and 5 with one more. Show 5 red on the top rod and 5 red on the bottom rod with one additional white bead, making the 5-5 pattern explicit.
7. Play team class games by pushing some of the top rod of beads and the class pushes the bottom set of beads to make the chosen number, e.g., To make 9, push 5 red beads to the left from the top row. Students push 4 on the bottom rod. Look and listen for strategies. Once shared a few times, students could be encouraged to play the game with a partner.

## Rekenreks

8. Make numeral cards from 1-20. Hold up a card at random and ask students to show that number on their individual Rekenreks. Allow one push for numbers up to 10 and two pushes for any number larger. Debrief various solutions with and how students arrived at the position of beads. To further this activity in pairs, students have a barrier between them. One student draws a card from the pile, saying the number out loud and making that number on their Rekenrek in any manner they choose. The first player provides a clue as to how many beads they pushed on the top rod but the partner must figure out how many are pushed on the bottom rod to replicate the partner's solution.
9. Determine all the ways to make 10, using beads from each row.
10. Use the Rekenrek to prove that  $3 + 2 = 1 + 4$
11. Ask: Is  $7 + 8 = 8 + 7$ ? How do you know?
12. Once familiar with the Rekenreks and the number of beads on each row, show some beads to the class and ask the class to figure out the number of hidden beads to make a certain number.
13. There were 12 students playing on the play structure in the playground. Four were on the top level. How many were on the bottom level?
14. Six students were on the stage in the gym practising for the school play, while four were on the floor setting up chairs. Three more students came to help. How many students were in the gym?
15. Out of the 20 cupcakes brought into class for Owen's birthday only 3 were left. How many were eaten?

### Recommended Websites

[http://therekenrek.com/about\\_the\\_rekenrek.html](http://therekenrek.com/about_the_rekenrek.html) – about the Rekenrek

[http://therekenrek.com/sample\\_lesson\\_plan.pdf](http://therekenrek.com/sample_lesson_plan.pdf) – sample lesson with the Rekenrek

[http://www.mathlearningcenter.org/media/Rekenrek\\_0308.pdf](http://www.mathlearningcenter.org/media/Rekenrek_0308.pdf) – using Rekenreks

<http://www.ronblond.com/MathGlossary/Division01/Rekenrek/REKENREK/index.html> – virtual Rekenrek

<http://www.k-5mathteachingresources.com/Rekenrek.html> – Rekenrek activities

<http://www.mefedia.com/watch/26880976> – video of students using Rekenreks

[http://www.mathematicallyminded.com/downloads/Rekenrek%20Activities\\_Directions.pdf](http://www.mathematicallyminded.com/downloads/Rekenrek%20Activities_Directions.pdf) – activities and instruction on how to make a Rekenrek