

Mental arithmetic for addition and subtraction to 100

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Helping children learn algorithms

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Alternative to the conventional approaches: students

- solve concrete or pictorial instances of problem, describe problem and solution in their language.
- learn to convert pictorial or concrete problems to symbols and vice versa.
- learn algorithm as a set of actions they apply to the quantity. To internalize each step students

say aloud the part of the symbolic statement they will do	say what they will do, that is, say the part of the algorithm they will do	do the action on the quantities	say what they did and the outcome of the action	write the action on the symbols
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This sequence bridges from the physical action on quantities to the action on the symbols. Saying the action is an intermediate step. It helps students to

- formalize the physical action, and to associate it with a mental action,
- store the action in short-term working memory and in long-term memory,
- analyse the action logically and
- learn a functional self-instruction sequence.
- apply action using self-instruction and visualizing ; don't use concrete materials.
- apply algorithm without saying aloud each step. They describe how they intend to do the problem and to outline the steps they will use. As well, they learn when to use the algorithm.