In the Head Calculations - Introduction

Skills for the adult world

Adult students come to numeracy class expecting to relearn all of the formal, pen and paper methods of calculation from their school days. However, in these days of calculators, spread sheets and computerised cash registers, it is just as important to be able to use 'in the head' or informal methods, and to be able to estimate and use a calculator efficiently. For these informal methods, what is written on paper will not a neat and orderly 'sum', but a few 'jottings' to help the shortcut or 'back-of-envelope' calculations.

These informal or 'in-the-head' approaches are powerful and important in the adult world. In industry and workplace settings estimation and quick checks of calculator and spread sheet results are essential to ensure that you don't get nonsense from the technology. Mistakes leading to wasted materials and labour are expensive in a work situation.

Informal approaches are not only important in the workplace. Many adults use them without thinking for rapid figuring of their capacity to save money from their annual salary or to pay off loans and bills.

Creative and individual strategies

Others adults, with less confidence in numeracy, have developed individual strategies, of which they are quite proud, to get around using the operations that they did not feel confident with at school. For example, there are many adults who tend to avoid multiplication, preferring instead to use repeated addition; these people get very fast and skilled at addition. There are many, many more who would never even think of trying division: somehow multiplication or repeated addition will get them close enough to the answer they need.

Boosting student confidence

Introducing shortcuts and practice at using 'in the head' techniques in the numeracy class can make adults feel really empowered. It validates the strategies they have developed for themselves which previously they would not think legitimate in a maths classroom. They can share their own methods and display their creativity, as well as expanding their repertoire of techniques. Once you help students acquire new strategies it is amazing how they will suddenly find uses for them, or bring to class stories of sharing them with others.

Some of the strategies in this section tap into students' existing skills, such as rapid addition, and allow them to extend their repertoire to calculating percentages without having to use the algorithms that they did not feel comfortable with. At the same time, it should be kept in mind that students will benefit from learning the multiplication facts

if they can. Some tips for helping students do this are included in the *Exploring Numbers* section of this resource.

Numbers sense not rote procedures

In the head methods focus on 'number sense' rather than algorithms, rules and formulae. They build on students' existing knowledge of number, encourage them to be more flexible in their calculations and eventually increase their understanding of how numbers work; their 'number sense'. This in turn vastly increases their ability to function with numbers in the world and their confidence with numeracy.

This section provides some of the more common strategies for in the head, or shortcut calculation and some opportunities for practice. It is just a beginning and by no means exhaustive; hopefully other strategies can be shared and discussed with students as they arise incidentally in class.

Adapting strategies to other uses

Most of the strategies can be extended from their original use to be applied powerfully and easily in other common situations which may be relevant to students in or out of numeracy classes. For example, 'counting on' when represented as a sketch in the *Calculating Change* activity can be used for any subtraction, but is also particularly powerful for time calculations: working out 'How long since…?' or How long ago was…? or 'How many hours of work should I be paid for?'

The strategy of splitting numbers for halving can also be used for heaps of percentage calculations, including 50%, 25%, 75% and even 2 ½ % and 17 ½ %, freeing learners from previously confusing, meaningless, percentage formulae (see the *Percentages* section).