## 8 What about the tests?

Will working on the Case Studies help to improve pupil's scores in "high stakes" KS3 tests, even though the tasks in the tests are so different?

There are three main reasons for believing that this is true:

- **The tests are changing**
  The tests are now being redesigned to match the newly revised National Curriculum Programmes of Study for Key Stages 3 and 4. These case studies address all the aspects of these, including the Key Concepts and Key Processes which require pupils to sustain substantial chains of reasoning working from *representing* a problem with mathematics, *analysing* this mathematical model to find solutions, *interpreting and evaluating* these solutions in the problem context and *communicating* the results and the reasoning that produced them. This is a broader range of mathematical performance than current tests, which concentrate on short 'items' that assess separate concepts and skills. Work on the case studies will give teachers a head start on this broader range of performance, as well as equipping pupils better for their future lives.

- **Connections build long term learning**
  There is a deeper reason for using rich problems in the mathematics classroom. They will improve understanding of basic concepts and skills by helping pupils build *multiple connections,* within and between topics and practical contexts. It is these links that give strength and robustness to conceptual understanding, reducing the fading grasp that every teacher knows so well, and saving the consequent time used for re-teaching.

  Only single connections arise naturally in the normal linear process of teaching, where one topic is linked to the previous one. In exploring more open situations, pupils begin to see multiple connections, as they select tools from their mathematical toolkit that will help them tackle a problem they have not met before. There was clear evidence of this in the *Building a school with bottles* situation, where pupils were linking different topics: estimation, measurement, areas, perimeters and so on.

- **Substantial problems improve motivation**
  For a few, mathematics itself is fascinating enough, particularly if brilliantly taught. For most people, using mathematics to gain power over problems in practical contexts, from the real world and from fantasy domains, motivates them to learn more. Teachers of English have long exploited this opportunity, which has been neglected in mathematics teaching. The cases studies help fill this gap.