



**Cogitas.** The name comes from the Latin meaning “you think”, and thus the motto for Cogitas is, “*Where students think to learn*”. The aim of these problem solving cards is to require students to think, not automatically, but laterally and systematically. Hopefully, students will learn that maths is amazing and fun, and that any problem can be solved, or at least progress can be made towards an answer, with some decent mental effort.

**Problem solving.** ‘Thinking is a predicate to action’ – thoughts need to become manifest to have any relevance. But too often people act without thought, and often waste time and effort because they ‘choose’ a flawed solution path. Students need to be taught that there are strategies that make solving a new problem easier. Teaching students to attack problems positively, with a range of strategies, is a vital skill in life, not just in Mathematics.

**Record working.** During the problem solving process, it is essential that students record their thoughts and calculations, so that they can re-trace their steps at a later date, either to check over their work to find computation errors, or to remind them of their thinking processes. Pencils are great, erasers are not – they hide our thinking!

### **The 9 key problem solving strategies**

1. Record the main numerical information.
  - Create a table    - Make a list
2. Use objects and drawings to help visualise the problem.
  - Draw a diagram    - Create a model    - Draw a graph.
3. Look for any numerical patterns.
4. Subdivide large problems into smaller components.
5. Find ‘1’ unit and use it as a base for more elaborate calculations.
6. Work backwards through the information.
7. Solve a similar problem to help identify the correct procedures.
8. Physically act out the problem.
9. Guess → Check → Revise.

Record each guess in a table or list.

This strategy is useful when no other strategy seems to work!