

CMEP philosophy

Our work is informed by the following beliefs about mathematics and mathematics education.

1. Mathematics is a worthwhile, interesting intellectual activity.
2. Mathematics is a human activity.
3. People are naturally curious about mathematics, and gaining mathematical understanding is intrinsically satisfying.
4. There are many ways to be mathematical.
5. Order, structure, deductive reasoning and beauty are fundamental aspects of mathematics.
6. A key mathematical activity is to grapple with problems that one does not yet know how to solve: this is where the interest lies, and where progress is made.
7. Everyone should have the opportunity to be mathematical and to succeed mathematically.
8. Intelligence and mathematical ability are not fixed: we can all develop our skills and understanding in many ways.
9. Exchanging questions and ideas is a valuable aspect of working mathematically.
10. We learn by studying our mistakes and misconceptions.
11. Authority lies in the structure of mathematics.

We are primarily creating resources for teachers (although the site is designed in such a way that students could usefully look at it too). We believe that only a teacher can determine what resources will work and in what ways with their given group of students, so we are producing resources in the expectation that they will be adapted for particular groups and teaching styles. Nonetheless, we have some aspirations for our resources. We want resources to be designed and used in such a way as to

- give students the opportunity to think mathematically;
- allow students to develop their own understanding;
- invite students to make connections for themselves;
- nurture students' mathematical independence; and
- help students to develop resilience, flexibility and creativity.

We believe that *everyone has to understand mathematics for themselves*.

Consequently, we want to create resources of which many

- are low threshold, high ceiling; in that they offer opportunities for mathematical thinking to a large proportion of the cohort with opportunities for more sophisticated thinking available
- provoke students' own questions and elicit the discovery of ideas;
- combine fluency, problem solving and mathematical reasoning
- encourage the appreciation and use of multiple approaches and multiple representations;

- are immediately engaging;
- are open;
- extend, deepen and broaden mathematical content knowledge;
- explore the role of mathematics within cultural settings;
- encourage generalisation and proof/justification;
- invite creativity and imaginative application of knowledge;
- offer a sense of satisfaction;
- are thought-provoking;
- have the potential to reveal underlying principles or make connections between areas of mathematics (“aha” moments);
- allow or encourage students to talk mathematically to each other; and
- get students to reflect on their own understanding.

Working with such resources, in the way in which they are intended to be used, will mean that mathematical understanding emerges naturally.

We believe that it is important that all students should work on resources of this type and in this way, not just those who presently achieve highly or who may be considering studying Mathematics at higher levels.

The structure of our website, with the tube map and pervasive ideas, reflects our perspective that mathematics is a coherent and connected enterprise. Our resources and site are designed to illustrate that and to enable students and teachers to see the coherence for themselves.

We do not think that teachers have to have a Mathematics degree in order to work in these ways: we are confident that a wide range of teachers can choose to use CMEP resources in accordance with our philosophy. Much more important than prior mathematical learning is a willingness to teach in this way, and enough confidence not to be afraid and to be a good role model for students. We prefer to think of teachers as facilitators of their students' learning, rather than arbiters of right and wrong.

An important aspect of CMEP is the involvement of both academics and teachers, in order that each group can contribute professional expertise and also learn from the other group.