

The Case Studies and Mathematics

'Where is the maths in these Case Studies?'

Activity 1

Reflect on the lessons, and the ways maths emerged (15 minutes)



Take some time to reflect on your own lesson and the Key Processes that were in evidence.

- What mathematical questions were identified?
- Did pupils use a range of mathematical representations?
- What relationships did they find in the situation?
- What calculations did they do? Could they interpret the meaning of these?
- Were they able to communicate their conclusions effectively?
- Did your pupils feel that this was different from a normal maths lesson?
- Are they now beginning to appreciate how the maths techniques they have studied may be linked to unfamiliar situations?

You will probably find that most of the tools that pupils chose to use was mathematics that they had been taught a year or two earlier. This is normal, for at least two reasons:

- The difficulty of a task reflects the *total cognitive load*, which depends on its *complexity*, its *unfamiliarity*, and its *technical demands*. If a task is complex and unfamiliar, pupils will use simpler techniques where they can.
- To be useful, concepts and skills have to be thoroughly absorbed and assimilated into the pupils' mathematical toolkit. This does not happen immediately but over time, through practice and, crucially, the building of multiple connections between topics and contexts of application.

Activity 2

When should we introduce mathematical techniques? 15 minutes

So far, we have been considering the role of the case studies in promoting Key Processes. The problems in the case studies also offer opportunities for developing mathematical *content knowledge*.



The Building a school situation offers excellent opportunities for pupils to develop competence in, for example, estimation, measurement, and calculations of area and perimeter. Pupils might make more progress if these topics are revised immediately *before* the situation is introduced. This might, however, constrain their thinking and reduce the task to an exercise in using these topics. On the other hand, these topics could be revised *during* or *after* working on the task, using the task to motivate the learning of technique.

- What are the advantages and disadvantages of each approach? Compare your thoughts with those given on [Handout 5: When should we introduce mathematical techniques?](#)
- Which approach would you choose and why?

If the goal is to enable pupils to *choose* which skills to apply, then we must sometimes allow them the possibility of choosing suboptimal, inefficient methods and living with the consequences. If we always tell them which techniques to apply, then they will not develop autonomy in problem solving.

Activity 3 Integrating case studies into a scheme of work 20 minutes

The Bowland Case studies offer a range of activities which we hope will motivate and challenge your pupils. Although it is tempting to see them as activities for a "wet Friday afternoon" or for after the exams, this would not make the best use of their potential to enhance your scheme of work throughout Key Stage 3. To help you decide how they could be integrated into your teaching, this package includes a short portrait of each Case Study together with an analysis of the mathematics that it involves – the Key concepts, Key processes and the Mathematical topics.



Use [Handout 6](#) *Typical maths activities in the Case Studies* and [Handout 7](#) *Types of problem used in the Case Studies* to choose a Case Study you might like to use.

- Will the context of this case study interest and motivate the class?
- Will it offer variety of learning activity?
- Does it feature the Key Concepts and Key Processes that they need more of?
- Can it be tackled with mathematical concepts and skills they have been taught?
- Will it show and develop connections between these topics and with new contexts?
- Does it provide a starting point for further topic teaching in our scheme of work?

Activity 4 What about the tests? 10 minutes



All teachers work to help their pupils succeed in the national tests. This can deter teachers from spending time on open activities such as the Case Studies which appear very different from test questions.

In what ways do you think the Case Studies will help prepare pupils for the National Tests?

Discuss the points raised in [Handout 8](#) *What about the tests?*

Further Reading

See [Handout 11](#) for suggested further reading.