



AMSP Professional development videos: Further Mathematics (Pure)

Aims of the session

- To encourage teachers to reflect on their own practice in how they introduce topics and encourage to make connections in Further Mathematics.
- To provide teachers with the opportunity to create and share useful resources that can be trialled in future lessons.

Resources needed

- A projector for showing the videos.
- Problem A and problem B questions.

Introduction

The first two videos in the Further Pure series demonstrate strategies for introducing topics and encouraging students to make connections in Further Mathematics. Discuss examples of how you currently introduce topics and encourage students to make connections in your own teaching.

Now watch the first video: **Introducing Topics in Further Mathematics**. After watching the video, you might like to continue the earlier discussion by considering the following questions:

- What are the advantages and disadvantages of introducing a topic in Further Mathematics by offering students an exploratory approach?
- Are there any topics in further maths that require more input from the teacher to introduce than others?
- Do you introduce topics in further maths in a different way to how you introduce them in A level Mathematics?

Pair work: introductory task

Choose one of the problems, A or B. For your chosen problem:

- Write the problem as a product of two matrices.
- Show how the product would change if the situation changed: e.g. different numbers of toppings for different sized pizzas or different number of points for a win.
- Discuss how you could use this problem to introduce matrix multiplication.

Pair work: main task

In pairs, select another topic from Further Mathematics and create a resource that you could use to introduce this to students. Some questions to consider when creating your resource:

- What key mathematical ideas do students need before starting this topic? How will you check that students' understanding of these is secure?
- How can you introduce the concepts using a mathematical context or a real-world context that the students are already familiar with?
- Are there opportunities for students to make connections with their existing mathematical knowledge?

If you have time, formulate a list of useful questions for the teacher to ask the class when using the resource and attach these to the file.

Sharing resources

Each teacher/pair should present their resource to rest of the department, with a short demonstration of how it might be used.

In a future meeting revisit the saved files and share feedback on their use; could any be developed further, or have any additional files been created since the initial training?

Next steps

Watch the second video: **Building mathematics knowledge and making connections**. After watching the video consider the following questions:

- What mathematical knowledge do students need to have from GCSE to access the pure topics in AS Further Mathematics?
- How do you encourage your further maths students to look for connections with maths that they already know?
- To what extent do further maths topics strengthen and extend mathematics that students meet in AS Mathematics?

Problem A

A pizza takeaway offers **Regular, Large** and **Family** size pizzas, with four possible toppings **Hawaiian, Seafood, Meat Feast** and **Vegetarian**. The number of pizzas ordered of each size / topping can be expressed as a matrix.

$$\begin{matrix} & H & S & M & V \\ R & \begin{pmatrix} 2 & 3 & 0 & 1 \end{pmatrix} \\ L & \begin{pmatrix} 5 & 7 & 8 & 4 \end{pmatrix} \\ F & \begin{pmatrix} 6 & 4 & 3 & 3 \end{pmatrix} \end{matrix}$$

Given that a regular pizza requires 2 quantities of topping, a large pizza requires 3 quantities of topping and a family size pizza requires 4 quantities of topping, **write out the calculation to find the total quantities of each type of topping to make these orders.**

Problem B

The table below is a league table for the group stage for the FIFA Women's World Cup 2015 held in Canada. The top 2 teams in the group progress through to the next round; scoring 3 points for a win, 1 point for a draw and 0 points for losing a match.

Group F	MP	W	D	L
 FRANCE	3	2	0	1
 ENGLAND	3	2	0	1
 COLOMBIA	3	1	1	1
 MEXICO	3	0	1	2

Calculate the total points for each team, writing out each calculation, and hence state which two teams progressed through to the next round.