



**Advanced Mathematics
Support Programme®**

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.

$$\begin{matrix}
 & \mathbf{H} & \mathbf{S} & \mathbf{M} & \mathbf{V} \\
 \mathbf{R} & \left(\begin{array}{cccc}
 2 & 3 & 0 & 1 \\
 5 & 7 & 8 & 4 \\
 6 & 4 & 3 & 3
 \end{array} \right) \\
 \mathbf{L} & & & & \\
 \mathbf{F} & & & &
 \end{matrix}$$

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.

Problem A (Pizza)

$$(2 \quad 3 \quad 4) \begin{pmatrix} 2 & 3 & 0 & 1 \\ 5 & 7 & 8 & 4 \\ 6 & 4 & 3 & 3 \end{pmatrix} = (43 \quad 43 \quad 36 \quad 26)$$

Problem B (Football)

$$\begin{pmatrix} 2 & 0 & 1 \\ 2 & 0 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 2 \end{pmatrix} \begin{pmatrix} 3 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 6 \\ 6 \\ 4 \\ 1 \end{pmatrix}$$

Pairs of complex numbers

- Can you find some pairs of complex numbers **whose sum is a real number?**
- Can you find some pairs of complex numbers **whose product is a real number?**
- Can you find some pairs of complex numbers **whose product is a purely imaginary number?**

About the AMSP

- A government-funded initiative, managed by MEI, providing national support for teachers and students in all state-funded schools and colleges in England.
- It aims to increase participation in AS/A level Mathematics and Further Mathematics, and Core Maths, and improve the teaching of these qualifications.
- Additional support is given to those in priority areas to boost social mobility so that, whatever their gender, background or location, students can choose their best maths pathway post-16, and have access to high quality maths teaching.

Contact the AMSP



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