The Scottish Mathematical Council

MATHEMATICAL CHALLENGE 2010–2011

Entries must be the unaided efforts of individual pupils.
Solutions must include explanations and answers without explanation will be given no credit.
Do not feel that you must hand in answers to all the questions.

Junior Division: Problems 1

J1. A lottery win is shared between three people. Allan gets 20 percent more than Jane, and 25 percent more than Charlie. Jane's share is £3,600. How much money does Charlie receive?

J2. In each region of the triangle shown there is a whole number, three of which are given.

Each number is the sum of the two numbers immediately below it and all numbers are different. Find out which number must be in the region marked with the star and explain why.
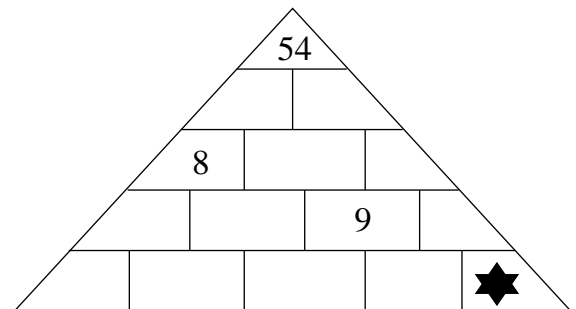
J3. Amanda, Brian and Claire enter the school talent contest. They each perform in one of three rooms in the morning and in a different one of the three rooms in the afternoon.
We know that

- Amanda's act is maths magic,
- one pupil moves from the hall to the gym,
- Claire is in the drama studio after lunch,
- Brian's morning room is taken by the singer in the afternoon,
- one pupil's act is juggling.

Find out where each person performs in the morning and in the afternoon, and what their act is.
**Justify your answer.**

J4. Write down any whole number containing four digits. Now write down a second number containing the same digits in a different order. Show that, when you take the smaller number from the larger number, you obtain a multiple of 9.
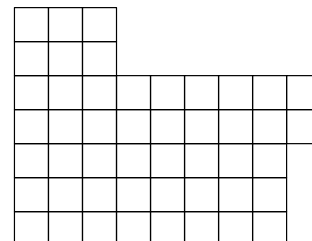Explain why this always works for any four-digit number.

J5.

By cutting along the lines, can you divide the shape on the right into two pieces which can be fitted together to make an eight by eight square?
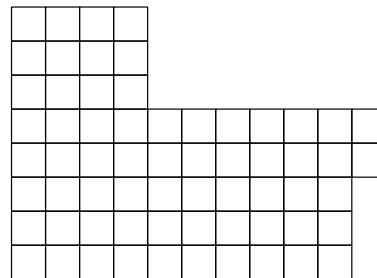
By cutting along the lines, can you divide the shape on the right into two pieces which can be fitted together to make a seven by seven square?

Justify your conclusions.

END OF PROBLEM SET 1