Emmy Noether – Circle 2 for 2005-2006

Part I: Problems

Problem 1:

Abdul has done several calculations, but has mixed up the answers. The questions were 3.01 x 0.605, 0.31 x 0.624, and 6.15 x 0.313. The answers are 1.92495, 1.82105, and 0.19344. His friend Mandeep immediately tells him the correct answers for each question, WITHOUT actually calculating them. Using mental math only, match the correct answers to each problem and explain how you know.

Problem 2:

Nanting was 1.3 metres tall in grade 5. She is now in grade 10, and has grown the same amount each year since grade 5. In grade 9, she was 0.3 metres taller than she was in grade 6. How tall is she now?

Extension:
Do you think Nanting will keep growing this way for another 6 years? Another 12 Years? Why or why not?

Problem 3:

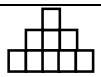
The 48 campers in the Junior Division live in six differently coloured tents along Golden Pond. The tent with the smallest group has 6 campers, and the orange tent has the largest group with 10 campers. The yellow and green tents are the only two tents with the same number of campers. The 13 youngest campers are in the red and blue tents, one of which has the least number of campers. The purple tent has 2 more campers than the blue tent.

a) How many campers are in each tent?
b) Would it be possible for the orange tent to have 11 campers if all the other conditions still held? Why or why not?

Problem 4:

At the right is a table of figures constructed from 1 cm squares, along with their areas, and the length of the bottom row.

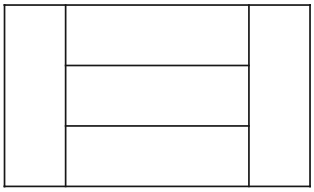
a) Complete the table for three rows, and then for the next three figures. (There is no need to actually draw the figures with 4, 5, and 7 rows once you spot the patterns.)
b) Given the number of rows of squares, how can you find the area of the figure?
c) Predict the areas of the figures with bottom rows of length 15 cm, and 25 cm.

Figure	Number of Rows	Area (cm^2)	Length of Bottom Row (cm)
	1	1	1
	2	4	3
	3		
	4		
	5		
	7		

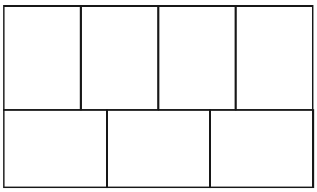
Extensions:
1) What is the length of the bottom row of the figure with area 144 cm^2?
2) Make a table giving the perimeters of the figures with 1, 2, 3, 4, 5, and 6 rows of squares. Can you find a pattern?

Problem 5:

The figure at right consists of five congruent rectangles with side lengths being whole numbers. If its perimeter is 32 cm, what is its area?



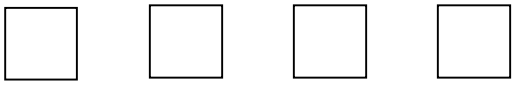
Extension:
The figure at right also consists of congruent rectangles with side lengths being whole numbers. If its area is 84 cm^2, what is its perimeter? What are the dimensions of each rectangle?



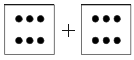
Problem 6: (Recommended for groups of 4 or more students)

PLAY THE BIGGEST NUMBER GAME
Each group needs a pair of dice, and each student needs a sheet of paper.

Draw four squares on your paper:



In each turn, you will roll the dice, add the two numbers and place the units digit of the total in any one of the squares.

For example:  = 12, so a '2' will be placed in one of the boxes.

If you rolled a 4 and a 6, what digit would you use?

Roll the dice. Determine the units digit. Each person should write that digit in any one of his/her own squares. Continue until all the squares are filled. The person with the greatest 4-digit number wins. After several rounds, discuss the following:

- What is the lowest possible digit you can get from one roll of the dice? How?
- The highest? How?
- How many different rolls can give the digit 2? The digit 7?
- How could you use this information in playing the game?
- Where should you place a 0? a 9? a 5? Why?
- What is the highest 4-digit number you could have formed with the digits rolled? the lowest?

Extensions:
1. Try the game with more squares, then with fewer squares. Which is more challenging? Why?
2. If each team member had their own set of dice, and rolled just for themselves, how would it change the game? Would it be a 'fair' game? Why or why not?